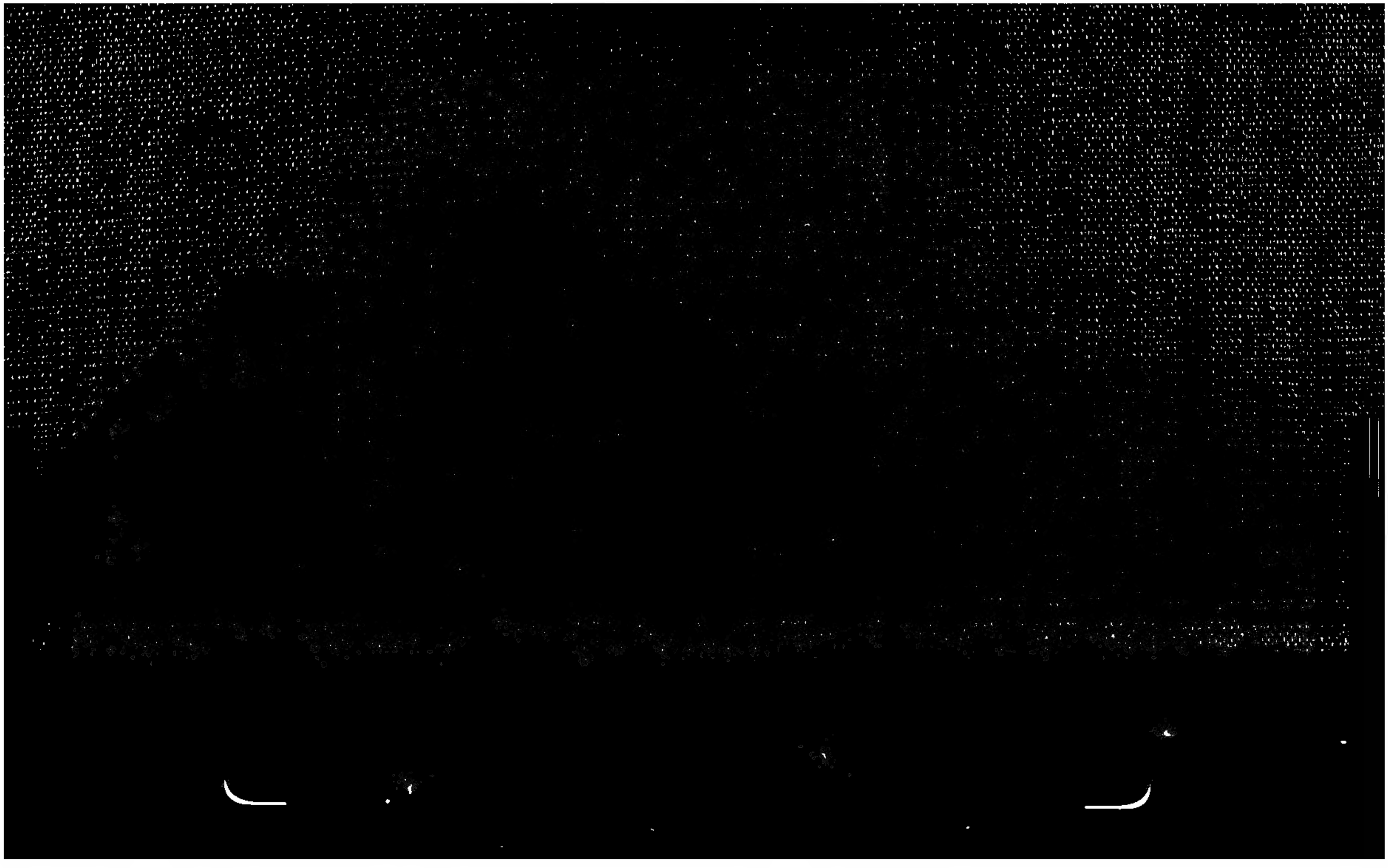

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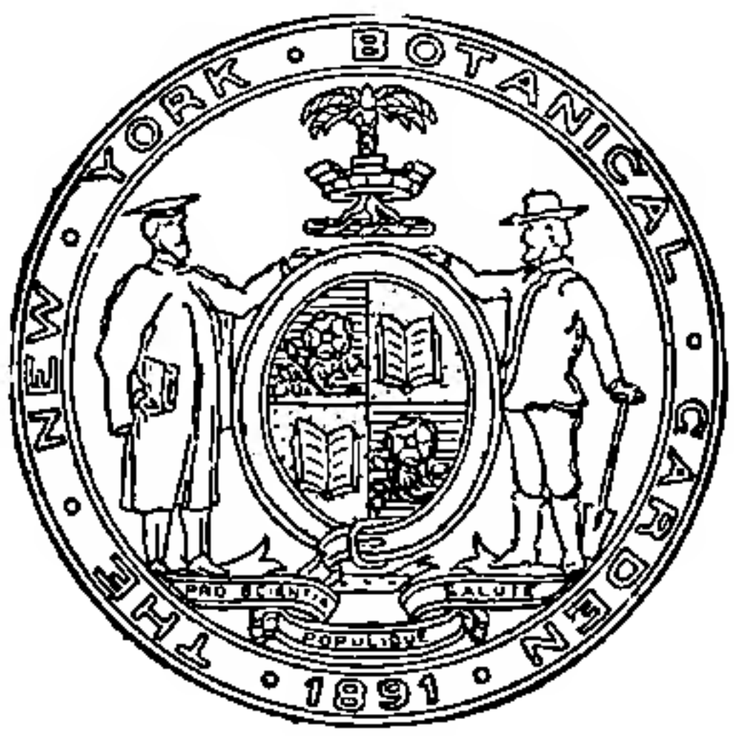

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ETHEL ANSON S. PECKHAM

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THE BIJOU DAYLILY, OF A NEW SMALL FLOWERED RACE

The Bijou Daylily is a selection from many seedlings of a new horticultural race of small-flowered daylilies developed by hybridizations with the wild species *Hemerocallis multiflora.* This species[1] has small flowers and the scapes are slender and much branched, bearing numerous blossoms. These characteristics are decidedly in evidence in all of the F_1 hybrids having *H. multiflora* for a parent that have thus far been obtained. In regard to flower colors, a rather wide range of types of species and hybrids were hybridized with the *H. multiflora,* including some with fulvous and with red shades, and as a result yellow, orange, and fulvous red colors are all obtained in the various hybrids.

The progenies of the various hybridizations involving *H. multiflora* now comprise several hundred seedlings. These provide excellent material for further selective breeding, especially in the efforts to obtain plants with still smaller flowers of greater number per scape, and such breeding is now in progress. But several of the most attractive seedlings already obtained seem worthy of general culture and these are now being propagated. One of these has been given the horticultural name Bijou and this plant is here described in print for the first time.

The seedling to be propagated as the clon Bijou Daylily is now only two years old and it has thus far been grown on rather poor soil. It has shown a noteworthy vigor in the rapid spread of rootstocks in the crown, which makes for rapid propagation. The scapes have reached a height of about two feet, which is consider-

[1] The species *Hemerocallis multiflora* was first described and illustrated with a colored plate in Addisonia (**14** : *pl. 464* J. 1929.) Later this species was discussed and illustrated by photographs in the Journal of The New York Botanical Garden **31**: 34–39.

FIGURE 1. The original seedling of the Bijou Daylily.

ably lower than the scapes of most of the F_1 hybrids of *H. multiflora*. The scapes are stiffly erect and much branched and they bear numerous flowers which average about 2½ inches in spread. The flowers are full, and the segments are spreading but not strongly reflexed. The ground color is a shade of orange, showing clear in the throat of the flower but otherwise strongly overcast with rich fulvous red in a combination of sprightly color effects. The season of flowering is in July. The foliage is abundant, rather erect-ascending, with the upper levels only slightly below the flowers.

FIGURE 2. Flowers of the Bijou Daylily.

The seed parent of the Bijou is a sister seedling of the Mikado Daylily (see Addisonia 15: *pl. 487*) and it is a complex hybrid having in its immediate ancestry the species *H. aurantiaca, H. flava,* and *H. fulva* clon Europa. The plant of *H. multiflora* used as the pollen parent of the Bijou Daylily has tall, erect, much-branched scapes and it is somewhat earlier in blooming than the other plants of the species.

The Bijou Daylily is a hybrid with four distinct species involved in its parentage. As to flower color it is to be classed as fulvous; in flower size it is very similar to the *H. multiflora* but the flowers are of a different shape. In its general ensemble of characters, the Bijou Daylily is a somewhat distinct and new type among the horticultural daylilies.

A. B. STOUT

AUTUMN IN THE GARDEN[1]

There are several things one thinks about in connection with autumn in the garden: the flowers that are in bloom then, the berried shrubs and fruiting trees, the gay coloration of leaves, the work that *must* be done with dispatch before the ground freezes too hard to manage and, above all, the planning for spring.

Among flowers that make our gardens gay, there will still be with us in early autumn, asters. Those Michaelmas daisies that bloom with us long before Michaelmas! Evolved from our own wild American asters, they have come to us from overseas and are now available in many good named varieties. One can get them tall, medium, and dwarf, large- or tiny-flowered, in all tones of mauve and bluish-pink and rose, starry flowered and fluffy-flowered. Excellent they are, but one should be careful not to uproot them in spring, as their leafy rosettes, naturally, are exactly like those of their ancestors, a noxious weed to our minds, and if not carefully labeled or if the memory be short, up they come and later wails will be plentiful when it is found the "daisies" are gone. Other flowers to bloom are colchicums. They send up their leaves in springtime and bloom in autumn with a

[1] Abstract of a lecture given at The New York Botanical Garden on December 5, 1931.

lily-like or tulip-like flower and here again we may choose between a number of varieties. First, a pinkish-mauve *Colchicum autumnale,* with a white form too, then a large pink beauty, *C. speciosum.* There is also an exquisite white *C. speciosum* of delicate texture and noble size. One with twisted petals, reticulated with darker pink, *C. giganteum,* is a form of *speciosum,* perhaps, and, indeed there are a number of named sorts ranging from deep magenta-pink to white. Crocuses bloom also in autumn, not the same sorts as those that flower in spring, of course, but real autumn-bloomers. The best known of these is *Crocus speciosus,* which is a deep powder-blue. *C. zonatus,* a pink mauve, the white *speciosus, C. pulchellus,* and *C. longiflorus* are all available in this country now. One should order these very early in spring and plant them the end of July or beginning of August, as soon as they arrive. The white *Crocus speciosus* combines beautifully with *Sedum Sieboldii,* which has pink flowers and is an autumn-bloomer. The flowers stay on a long time and the gray-green leaves turn a lovely pink before dying away for the winter sleep. Noticeable will be a combination of *Crocus pulchellus* with the gayly colored leaves of epimediums. These latter grow well in shade or semi-shade and are useful to combine with small bulbs such as snowdrops or the earliest snowflakes (*Leucojum vernum*).

In passing about the garden one notices sweet alyssum in generous flower, in fact, looking its best of all the year; the lilac variety really is lilac at last! Some gardeners in their tidying ruthlessly pull alyssum up in falltime but it were better to leave it to be cleaned off in spring, as it is a protection for the small bulbs it ground-covers and it then gets a chance to sow its seed and carry it over winter.

Chrysanthemums will be in full fling and if you were smart and saved the handsome small-flowered pot-plants given you the autumn before by putting them by in a frame and breaking up in spring and planting in your borders, you can surprise your friends by an added richness of color one does not always attain with the definitely hardy sorts.

The principal work in autumn is perhaps getting ready for spring, and this means not only thoroughly weeding and tidying one's garden, but planting bulbs which will bloom in spring, mov-

ing certain shrubs, and such tasks. Dahlias must be lifted and while doing it put their labels on them and set them away in "soap" boxes of garden soil to winter in the root cellar. Keep only those that really were of a good color, really held up their heads, and really bloomed well, and promise yourself you will get some seed of Coltness hybrids, those tiny single bedding-dahlias, for next year. Then, in autumn again select and only save the very best colors, the most perfect flowers and prolific bloomers. Lift gladioli and set them away with their tops on to dry in peach baskets to be cleaned later on. Plant the peonies you ordered in summer when you went to the "specialists" and chose the varieties you liked best and which, if you did it the right way, you decided upon by the ratings of the Peony Society instead of thinking the best were those that cost the most. Think about tree-peonies and make up your mind to look for them next year and get at least one. Remember that shrubs and trees with soft roots should be planted in spring, so leave the magnolia moving until then, but transplant any fibrous-rooted ones you wish. Therefore you will be able to plant crabapples and Japanese cherries and while doing so put in a sweet cherry or two and a quince. Their flowers are lovely and the fruit will be of use to you. If you have grape-hyacinths that have a new growth of foliage, do not be tempted to cut it off, as the bulbs need it, so watch out where these are planted in grass and do not cut it in autumn. Polyanthus narcissus such as "Paper-white" are not hardy here, so if you have flats or pots planted for house decoration bring inside to a cool room before freezing weather sets in. This means you should have potted the bulbs in August or the very first of September at the latest. Narcissus and crocuses will need to be planted and you should get them into the ground just as quickly as you can after they arrive. Tulips are best planted the third week in October, as they do not then come up too early to get nipped by late frosts. In planting your bulbs, remember the rule for depth, "Cover once and a half their own size measuring from bottom to where the neck begins." Place bulbs on the bottom of the hole; do not hang in too small a hole. Put sand in the holes with lilies, put naphtha flake in with crocuses and tulips to discourage mice. Do not cover until the ground is *frozen*. If you have ordered lilies and they do not seem to arrive,

get the ground ready for them and keep it from freezing so you will be able to plant later, by covering with manure or hay and leaves at least a foot deep. If even then you still cannot dig after the lilies come, pot them and keep in a cool cellar, watering once a month until spring, when they can be set out in the beds.

In October, plant your oncocyclus irises in pots for the house and replant *Iris bucharica* (which you had taken up in June to dry off) in the garden in a sheltered spot. Sow your iris seeds (collected in August and September) in October and try raising some of the California native varieties from seed. They are easy but do not transport well as plants. If you have transplanted bearded irises, give them a mulch after the ground has frozen but *never* put it on top of the plants—only between, simply to prevent "heaving" in late winter and give a covering of salt-hay or corn-stalks or excelsior and make it a very light one to keep off the sun. Pull off all leaves of irises that look diseased. Burn them and sprinkle semesan about the plants. Cut off also the delphiniums, collecting all fallen leaves about the clumps and burn them and put semesan here too and some sifted coal-ashes if you like. Cut down the tops of asters and chrysanthemums but do not let the former lie on the beds. They are a good protection, to be sure, but oh! the seeds sown thereby to have to be pulled out next summer!

Climbing roses should have had the old flowering wood cut out in summer, but be sure all is tied up now securely. Put piles of sifted soil around and over the centres of your hybrid-tea roses, turn bushel baskets or soap-boxes over the eremuri or put piles of leaves held down by brush and, last of all, *before Christmas* prune the grape-vines.

ETHEL ANSON S. PECKHAM

8

FUNGI IN THEIR HUMAN RELATIONS[1]

Foods, Medicines, and Poisons

The importance of fungi to human beings might be discussed from many angles. To a limited extent fungi serve as food. For this purpose, chiefly the higher forms, such as mushrooms and truffles, which have fleshy fruit bodies, have been used. However, if advertising can accomplish anything we shall soon all be eating yeast, which is one of the simpler forms of fungous growths.

Fungi are also occasionally the cause of poisoning, chiefly through the eating of poisonous mushrooms mistaken for the edible types. A parasitic fungus, the common ergot of rye (*Claviceps purpurea*), has been the cause of occasional epidemics of chronic poisoning among people who have eaten infected grain, the symptoms being paralysis of the extremities, often followed by gangrene. The poison derived from this fungus, under the name of ergot, is widely used in smaller doses as a therapeutic agent.

Fungi in Fermentation

We are all familiar with the fact that the various processes of fermentation used in the preparation of beverages and foods are caused by the growth of fungi. The production of wine and beer is brought about by inoculating mashes of fruit or grain with a yeast. The same organism is employed in the raising of bread.

The production of cheese, which is dependent in the first place on the growth of bacteria in milk, is in its refinements dependent on fungi of the mold group. The flavor of certain cheeses depends for the most part on the special fungus used in their production. Limburger depends largely on bacterial action for its flavor, but Roquefort is the result of the action of a *Penicillium*, which can be seen in blue-green masses in the cheese. Camembert is produced by another species of the *Penicillium*, which forms the greenish-white felt that covers the surface of the cheese.

[1] Abstract of an illustrated lecture given at The New York Botanical Garden, Saturday afternoon, May 23, 1931.

For a long time the production of these cheeses depended on indirect methods of inoculation, such as burying the cheese, placing it in suitable damp locations or inoculating it with a piece of older cheese. These methods were developed without any real understanding of the nature of the process and for a long time it was possible to produce these cheeses only in the places where they had been formerly made and where the necessary fungus was abundant. Mycological studies of the organisms involved and their isolation in pure culture have made the production of a satisfactory cheese more certain and regular. The dairy men in Wisconsin can now imitate the products of their Swiss predecessors very closely. The processes have not, however, been absolutely analyzed, because the old traditional methods depended on a mixed growth of several fungi. The cheeses produced by pure cultures, while essentially the same, are apt to differ slightly from those produced by older and cruder methods.

The growth of fungi has also been used in a few industrial processes, although their possibilities in this direction have not been completely explored. They are extremely active excitants of chemical decomposition. A familiar one is the production of citric acid by the action of *Aspergillus* on sugar. Similar organisms are used in the manufacture of compounds difficult to synthesize by the action of non-living chemical agents.

Fungi and Plant Diseases

One of the most important ways in which fungi influence our life is in the destruction they cause among food crops and flowering plants. We can also charge against them a number of serious and destructive diseases of domestic animals. On the other hand, we can credit them with the destruction of a vast number of insect pests.

Fungi and Human Diseases

At first sight, there seems little resemblance between a vat of fermenting malt and a man sick with a fever, and yet before the invention of the microscope and long before the proof that microbes were the cause of disease, the similarity of these two phenomena was recognized. In the seventeenth century Robert Boyle

predicted that the man who solved the problem of fermentation would also find the cause of infectious diseases.

Aside from the puzzling sight of a new type of energy being liberated in the fermenting liquid or in a sick person, there was a striking similarity in the element of contagion in the two processes. What contagion consisted of no one knew, but even the ancient Greeks recognized that something happened when a healthy individual came in contact with a sick one, and the students of fermentations realized that these processes could be initiated by the contact of a non-fermenting fluid with a fermenting fluid. The discovery that these contagions were due to the transfer of a microscopic living being from fluid to fluid, or from patient to patient, was not made until nearly the middle of the last century, when Schwann and Cagniard-Latour proved that the fermentation of beer and wine depended on the growth of yeast organisms in the fermenting fluid.

The first micro-organisms observed as being the cause of disease were also fungi, probably because they were larger and more easily seen by primitive microscopes than the bacteria. In 1839 Langenbeck discovered a fungus very similar to Schwann's yeast in thrush, a mild disease which commonly affects young children and forms white patches on the tongue and lining of the cheeks. In the same year Schoenlein discovered a filamentous form of fungus in the hairs of patients affected with favus, a chronic disease which causes the destruction of hair in areas of the scalp. Soon after this the discovery of bacteria as the cause of general infections overshadowed in interest and importance these observations on fungi as the cause of disease.

For a long time our attention has been focused more on the bacterial infections, because these are commonly met and include most of the diseases which are the cause of death. The study of fungi which cause disease has, however, been continued and evidence accumulated to show that this type of micro-organism is responsible for a great many common, although not severe, infections and for a few rare infections which are extremely severe.

Our knowledge as to these has developed slowly and is still imperfect, because, while the observation of these organisms is easy on account of their size, we really know less about them than we do about bacteria.

II

Parasites and Pathogens

An attempt to understand why and how fungi produce disease brings up many fundamental questions as to how and why micro-organisms in general cause it and to understand it at all one must consider the general problem of infection.

The process of producing disease is one of colonization. If a bacterium or fungus is to succeed as a disease-producer, it must develop certain properties. Like any colonist it must be able to obtain food and fuel in the place it colonizes. It must be able to defend itself from efforts to dislodge it or to attack aggressively any foes which attempt to dislodge it, until it renders them impotent. It must also develop a means of arriving at new places of colonization and unless the colonization is successful and independent, it must maintain a base from which new colonists may arrive.

An ordinary mold, if it is placed on human skin, finds no food which it can utilize and has no means of penetrating the skin in search of food. If it is introduced into a wound it is promptly attacked by leucocytes which kill it and it can neither protect itself against these defense agents nor attack them. If it lands on a toe-nail that is a little dirty, it may find enough food to maintain a precarious existence, but it never succeeds in really establishing itself.

A more successful parasite is the colon bacillus, which grows profusely in the lower intestines of all men and most animals after they are a few days of age. It is able to obtain and utilize all the nourishment it needs from the intestinal contents. It does no harm and the body makes no attempt to get rid of it. A contrasting parasite is the cholera vibrio which also gains entrance to the human intestine, finds suitable food, but which in its growth produces substances which are violently poisonous; that is, it is pathogenic. The human whom it has invaded becomes extremely sick, his body makes violent efforts to get rid of the parasite and the attempt of colonization ends either with the death of the individual or the expulsion of the cholera vibrios.

The colon bacillus is a wise parasite. It does not injure its host and consequently no reaction to eliminate it is developed. When it reaches a baby's intestines, it has provided shelter and abundant food for itself and descendants for the next fifty or

sixty years. The cholera vibrio which kills its host has to find some other shelter and source of food, either in a new victim or in water and soil where it is exposed to competition and destruction by many other micro-organisms. This probably explains why colon bacillus parasitism is so universal and cholera infection fortunately so rare.

The ability of a micro-organism to cause disease depends on a number of factors. It may have the ability to grow on some special tissue or some area of the body, and what we call the disease may consist largely in the disintegration of the tissue which the parasite consumes as food. Ringworm of the scalp, which we shall mention later, is a good example of this. It may grow locally, but in its growth may produce substances which poison the cells of the patient, and the reaction of these cells and of the body in general to get rid of the parasite may constitute the chief phenomena of the disease. Take the common boil for example. Here the pain, the swelling, and the discharging of pus are due chiefly not to anything which the bacterium does, but to the effort of the body to get rid of it.

A third type of procedure is for the parasite to colonize some part of the body in which it produces a poison which is absorbed and which causes general disease. Diphtheria and scarlet fever are good examples of this.

Most bacteria and fungi are adapted to live only on certain hosts. Some types of ringworm, for example, will affect men, dogs, and cats, and human infections are frequently contracted from animals. Other types of fungi will infect men, but are unable to grow on the skin of dogs and cats. The ability of the parasite to live on other hosts or as saprophyte on dead material is of importance in its success as the disease producer. The ability to infect other animals and quite possibly plants, and the ability of fungi to grow on dead organic material around us, greatly increase their chance of reaching new human victims and defeat efforts to prevent disease by quarantining infected human beings.

Diseases Caused by Fungi

The majority of pathogenic fungi require access to the air and attack only the skin, hair, and nails. A few species can, like the bacteria, obtain their oxygen in body tissue and can invade the body and produce systemic disease.

The problem of fungus infection of the feet, called by physicians "ringworm" or "dermatophytosis," and by patent medicine men "athlete's foot," has become familiar to many either through the persistency of advertisers or through personal experience. Surveys of college students indicate that from ten to thirty per cent are infected with this disease. It has become on this account a health problem of some importance, for while the disease is usually a trivial one, causing only mild discomfort, it is frequently disabling and occasionally opens the path for severe types of septic infection. It is peculiarly resistant to treatment and no effective methods to prevent its spread have as yet been devised. It is not always the mild local process that it appears to be. We have proof that in some cases the parasite invades the circulation and we know that it can produce secondary skin eruptions on the hands and other portions of the body. It may illustrate the need for further study of these parasites to emphasize the fact that we do not know as yet, whether all or even most of the cases diagnosed as dermatophytosis are really due to fungi, or what or how many troublesome skin eruptions are the result of this foot infection. Such knowledge awaits the development of more exact methods of diagnosis.

The same family of skin plants or dermatophytes which produce this foot eruption cause disease of the hair in children, and ringworm on other parts of the body. The hair infection is a peculiarly obstinate one and a difficult medical problem, both in treatment of the individual case and in prevention of spreading of the infection. It will indicate its importance to tell you that there is a special school on the grounds of the Hôpital St. Louis in Paris conducted so that children with ringworm of the scalp may continue their education without endangering other children.

A closely related fungus causes a more disfiguring and lasting scalp disease known as "favus." This infection is prevalent in eastern Europe, but through the vigilance of the quarantine authorities it has been kept very low in this country.

In addition to these somewhat familiar diseases of the skin and hair we might mention some of the more serious fungus infections. Sporotrichosis is a disease of nursery men and florists, probably contracted from plants. It causes the development of nodules and ulcers in the skin and occasionally involves the bones

and internal organs. Actinomyces, which causes a serious common disease of cattle known as "lumpy jaw," occasionally attacks man, producing a disease which is always intractable and frequently fatal. Blastomycosis, another form of generalized fungus infection, the origin of which is unknown, is usually fatal. A most interesting problem is presented by the disease known as "coccidioidal granuloma," a disease which is fairly prevalent in one river valley in California and almost unknown in any other part of the world.

In order to control these diseases due to fungi we need more knowledge as to the nature of the parasites, especially as to how they differ from harmless fungi. We need to know their susceptibility to antiseptics and to drugs. It will also be necessary to find out where and how they live outside the body, if we are to detect and eradicate sources of infection. Such studies require the coöperation of botanists who understand fungi with physicians who understand disease. It is to be hoped that by such coöperation the infections due to these microscopic plants may eventually be eradicated.

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PHOTOSTAT COPIES OF CHARLES DARWIN'S LETTERS IN COX COLLECTION ARE SENT TO DOWN HOUSE

In 1912 The New York Botanical Garden acquired the notable Charles Finney Cox collection of Darwiniana, which is maintained in the library as a special collection. Mr. Cox was one of the original incorporators of the Garden, a member of the Board of Managers, and for many years served as Treasurer of the Garden. His collection of Darwiniana was acquired by purchase after his death through contributions supplied by twenty-seven members of the Board of Managers as a memorial to Mr. Cox. A complete catalogue of this collection was published by Doctor John Hendley Barnhart in 1913.[1]

[1] The Charles Finney Cox Collection of Darwiniana. Jour. N. Y. Bot. Gard. 14: 1–29.

Shortly after Darwin's home, Down House, Downe, Kent, England, was purchased by Mr. George Buckston Browne, F.R.C.S., in 1929, and presented to the British Association for the Advancement of Science, to be maintained as a Darwin memorial, Doctor Henry Fairfield Osborn, President of The American Museum of Natural History, suggested the desirability of making some contribution from the Cox Collection of Darwiniana to the collections maintained at Down House. Unfortunately, however, no duplicates existed in the Cox collection, and under the terms of the gift to The New York Botanical Garden it seemed unwise to segregate any of the publications from the collection. Moreover, it was felt that, even if this were done, they would merely duplicate books already in the collection at Down House.

Fortunately, however, there exists in the Cox Collection of Darwiniana a notable series of 169 letters written by Charles Darwin to various correspondents between the years 1855 and 1881. When Doctor Osborn again communicated with me regarding the matter of a contribution to the collection at Down House in 1931, plans had been consummated for installing a photostat as an adjunct to the library of the Garden. It then occurred to me that photostatic reproductions of the Darwin letters would form a peculiarly valuable contribution to the Down House collection of Darwiniana, particularly as most of these letters were written there. I therefore informed Doctor Osborn that I proposed to execute this plan as soon as the photostat was installed and in operation. The first extensive task accomplished with the new photostat was the reproduction of the Darwin letters, a total of 639 sheets, and these were transmitted on November 6, 1931, to Mr. O. J. R. Howarth, Secretary of the British Association, who now resides at Down House, with the compliments of the Board of Managers of The New York Botanical Garden. It seems peculiarly fitting that fac-simile copies of these original letters be returned to the place in which they were written, particularly in view of the fact that an attempt is being made at Down House to assemble all possible data bearing on Charles Darwin and his notable accomplishments.

The following letter from Mr. Howarth reports the receipt of the gift:

"Your most generous gift of photostats of Darwin's letters from the Cox collection has now been reported to the Down

House Committee of the Association, and its members have been enabled to see the letters. I am directed to convey to you the warmest thanks of the Committee for this gift, and am to request that Dr. Fairfield Osborn, whose interest in Down House is so much appreciated, may be informed accordingly."

E. D. MERRILL

A GLANCE AT CURRENT LITERATURE[1]

"What is coming in tree peonies?" asks the *American Peony Society Bulletin* for September. H. G. Seyler accordingly names a number of choice varieties, and points out that though they are difficult to propagate, and therefore high-priced, they are hardy and very beautiful. Herbaceous grafting is the most successful method, he says, using some such peony as Festiva Maxima as the stock. The "trees" should be mulched with straw in November, and uncovered again in March.

* * * *

Tulips have received attention in Turkey for many centuries, according to Arthur Baker in the September *Journal of the Royal Horticultural Society.* He has found volumes dating back to 1615, dealing with minute details of their culture, and he names the years 1700–1730 the Tulip Epoch. In 1720 there were 829 named varieties, with many magnificent blossoms described, some the color of the bud of the Judas tree, some with needle-pointed petals, some with stripes, and some with three blossoms growing on one branch. Many traders were then engaged in the sale of tulip bulbs, to which fanciful names were attached in Persian, Arabic, and Turkish.

* * * *

Onions, leeks, and garlic were used in ancient China, and in Egypt and neighboring countries in earliest Bible times, says Hilderic Friend in the *Gardeners' Chronicle* for October 13. Among the ancient references to these pungent bulbs is one mentioning them as part of the diet of the builders of the pyramids. Mohammedans refuse to partake of them before visiting the mosque or assembling for devotions, because Mahomet himself disliked their odor.

* * * *

A handy book lately published by the United States Department of Agriculture is W. A. Dayton's "Glossary of Botanical

[1] All publications mentioned here—and many others—are available in the library of The New York Botanical Garden in the Museum Building.

Terms Commonly Used in Range Research," designated as Miscellaneous Publication No. 110. Though it makes no claim of either completeness or originality, its thousand or more terms, all of which are clearly defined, and many of which are illustrated, give it a scope which is adequate for more than ordinary use. Another volume by W. A. Dayton, also published this year, is "Important Western Browse Plants" (No. 101), which explains and describes plants accessible for feeding in the West. It is illustrated with both drawings and photographs, and includes ample descriptions of poisonous plants.

* * * *

There seems no end to the articles on how to make a rock garden. One of the latest (and a very good one, too) is contained in the semi-monthly news letter of the Division of Horticultural Crops and Diseases, of the United States Department of Agriculture, dated October 15

* * * *

The autumn issues of *New Jersey Gardens* contain a number of valuable articles on such ever-important gardening topics as transplanting and weeds and fertilization; peonies, bulbs, and window-boxes; and how to keep flowers in bloom in the garden from spring until winter sets in.

* * * *

Enhancing the beauty of the garden with wider use of small flowers is the subject of Everett Earle Stanard in the November *Gardeners' Chronicle of America.* With words and photographs he gives a charming picture of a garden replete and redolent with bloom.

CAROL H. WOODWARD

NOTES, NEWS, AND COMMENT

Dr. E. J. Schreiner, of the Oxford Paper Company, a former student of the Garden, recently spent several weeks at the Garden in studies connected with work on hybrid poplars.

Dr. Marshall A. Howe, Assistant Director, gave an illustrated talk on "The New York Botanical Garden and its Work," at a

luncheon and "Social Day" of Sorosis at the Waldorf-Astoria on December 7. On October 25, he spoke on the same subject, following a Sunday dinner of the graduate women students of Columbia University in Johnson Hall.

Drs. E. D. Merrill, J. K. Small, H. A. Gleason, and F. J. Seaver represented The New York Botanical Garden at the meetings of the American Association for the Advancement of Science, the Botanical Society of America, etc., held at New Orleans, December 28–January 2. Dr. Merrill was chairman of Section G (Botany) of the A. A. A. S., and one of the vice-presidents of the Association; in the absence of President Boas and retiring President Morgan, he presided at the general meeting of the Association and at meetings of its Council. Dr. Seaver was chairman of the Mycological Section of the Botanical Society of America; Dr. Small arranged an exhibit of numerous new species and forms of Iris from the Mississippi Delta; and Dr. Gleason contributed a paper on "The Progress of Botanical Exploration in Tropical South America."

The visitors to the library during the autumn included the following botanists: Dr. Lyman B. Smith, Dr. Ivan M. Johnston, and Dr. Hugh M. Raup, Cambridge, Mass.; Dr. Walter H. Snell, Providence, R. I.; Mrs. K. B. Winton, Wilton, Conn.; Mr. S. H. Burnham, Ithaca, N. Y.; Mr. C. M. Roberts, Fairmont, W. Va.; Mr. Earl L. Core, Morgantown, W. Va.; Mrs. Agnes Chase, Dr. Anna E. Jenkins, Dr. Philip Weiss, Dr. E. S. Schultz, Mr. W. W. Eggleston, Mr. E. P. Killip, and Dr. Walter T. Swingle, Washington, D. C.; Mr. Clair A. Brown, Baton Rouge, La.; Miss Lily M. Perry, St. Louis, Mo.; Mr. Robert B. Gordon, Columbus, Ohio; Prof. Shigeo Yamanouchi, Chicago, Ill.; Prof. A. C. McIntosh, Rapid City, S. D.; Dr. H. G. MacMillan, Los Angeles, Cal.; Dr. Edith C. Clements and Dr. Frederic E. Clements, Santa Barbara, Cal.; Dr. M. C. Rayner, Bedford College, London, Eng.; Mr. E. W. Mason, Kew Gardens, London, Eng.; Dr. Aarno Cajander and Dr. Viljo Kujala, Helsinki, Finland; Mr. Harvey M. Bassler, Iquitos, Peru; and Mr. C. Vigne, Gold Coast Forest Service.

Meteorology for December. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: *70° F on the 12th;* 62° on the 16th and the 23rd; and 51° on the 30th. The minimum temperatures recorded were: 20° on the 6th; *19° on the 8th;* 21° on the 21st; *19° on the 27th;* and 24° on the 29th and the 31st. The total precipitation for the month was 2.31, with traces of snow on the 7th and the 9th.

Meteorology for the year 1931. The total precipitation for the year was 34.24 inches (including a total snowfall of 4¾ inches, which is figured as equal to 0.475 inches of rainfall). This was distributed by months as follows: January—2.25 inches, with traces of snow; February—2.3825 inches (including 0.3125 inches as melted snow or 3⅛ inches snow measurement); March 4.18 inches (including 0.15 inches as melted snow or 1½ inches snow measurement); April—3.45 inches; May—4.05 inches; June—3.56 inches; July—3.49 inches; August—3.96 inches; September—1.60 inches; October—2.75 inches; November—0.262 inches (including 0.0125 inches as melted snow or ⅛ inch snow measurement); and December—2.31 inches, with traces of snow.

The maximum temperature recorded for the year was 101° on the 7th of August. The minimum temperature recorded was + 10° on the 15th of January.

The latest freezing temperature of spring was 32° on the 12th of April. The ice in the middle lake was completely gone on March 6th. Ice completely covered the surface of this lake on the 8th of December. The first killing frost of the autumn occurred on the morning of the 7th of November.

ACCESSIONS

LIBRARY ACCESSIONS, MARCH 1–SEPT. 30, 1931

AVERILL, MARY. *Japanese flower arrangement (Ike-boma) applied to western needs.* New York, 1919. (Given by Dr. J. H. Barnhart.)

BERNARD, NOËL. *L'évolution des plantes* Paris, 1916.

BIGELOW, HENRY BRYANT *Oceanography; its scope, problems, and economic importance.* Boston, 1931. (Given by Dr E D Merrill.)

BONATI, GUSTAVE HENRI. *Le genre Pedicularis L.; morphologie, classification, distribution géographique, evolution et hybridation.* Nancy, 1918. (Given by Dr. E. D. Merrill.)

BOWER, FREDERIC ORPEN. *Size and form in plants with special reference to the primary conducting tracts.* London, 1930.

BRITTON, NATHANIEL LORD, & BROWN, ADDISON. *An illustrated flora of the northern United States, Canada and the British possessions.* 3 vols. New York, 1896–98. (Given by Mrs. P. A. Rydberg.)

CARTER, HUMPHREY GILBERT. *Descriptive labels for botanic gardens* Cambridge, 1924.

———. *Our catkin-bearing plants; an introduction.* Oxford, 1930.

COHEN, MORRIS RAPHAEL. *Reason and nature; an essay on the meaning of scientific method.* New York, 1931. (Given by Dr. E. D. Merrill.)

DEGENER, OTTO *Illustrated guide to the more common or noteworthy ferns and flowering plants of Hawaii national park.* Honolulu, c 1931. (Given by the author.)

DIELS, LUDWIG *Pflanzengeographie.* Ed. 3. Berlin, 1929. (Given by Dr. E. D. Merrill.)

FAUGERAS, JACQUES *Oranges, citrons, pamplemousses; leur culture et leur commerce en Floride et en Californie.* Paris, 1931.

FEKETE, LAJOS, & BLATTNY, CTIBOR EUGEN MARIA KAREL. *Die Verbreitung der foerstlich wichtigen Bäume und Sträucher im hungarischen Staate.* 2 vols. Selmecbánya, 1913.

GARDINER, JOHN STANLEY, & TANSLEY, ARTHUR GEORGE. *The natural history of Wicken Fen.* Parts 1–5. Cambridge, 1923–29.

GEILINGER, WALTER. *Der Kilimandjaro; sein Land und seine Menschen.* Bern, 1930. (Given by Hans Huber, the publisher.)

GILL, TOM. *Tropical forests of the Caribbean.* [Washington] c 1931.

GOERTZ, OTTO DANIEL. *Untersuchungen über septierte Thyllen, nebst anderen Beiträgen zu einer Monographie der Thyllenfrage.* Lund, [1916].

HARNED, JOSEPH E. *Wild flowers of the Alleghanies.* Oakland, c 1931.

HIGGINS, ETHEL BAILEY. *Our native cacti.* New York, 1931. (Given by Dr. F. T. McLean.)

HU, HSEN-HSU, & CHING, REN-CHANG. *Icones Filicum sinicarum.* Fasc. 1. Nanking, 1930.

Iconum botanicarum index londinensis. Vol. 6. 1931.

Iowa state college journal of science.. Vols. 1–4 Ames, 1926–31. (By exchange.)

JACKSON, ALBERT BRUCE *Catalogue of the trees & shrubs in the collection of the late Lieut Col. Sir George Lindsay Holford.* Oxford, 1927. (Given by Dr. J. H. Barnhart.)

JACKSON, BENJAMIN DAYDON. *A glossary of botanic terms with their derivation and accent.* Ed. 4 London, 1928.

JOHNSON, ARTHUR MONRAD. *Taxonomy of the flowering plants.* New York, c 1931. (Given by the Century Co.)

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Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 41,700 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural, and forestal subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
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COÖPERATION WITH THE ROERICH MUSEUM

As an immediate outcome of the Roerich Central Asiatic Expedition in 1923–1928 under the leadership of Professor N. de Roerich, the Roerich Museum of New York established a research center in the western Himalayan region in 1928 in the Urusvati Himalayan Research Institute of the Roerich Museum, at Naggar, Kulu, Punjab, British India, active work actually commencing in 1929. The founders of the Institute, Professor and Madame de Roerich, realized the urgent necessity of establishing a permanent center for scientific research in the field, where problems could be intensively studied over a long period of time, a plan that is impossible of consummation on the basis of a limited expedition. The establishment of this center added to the scope of the Roerich Museum the wide field of scientific research, including the biological sciences, bio-chemistry, medicine, archaeology, and related sciences.

This Himalayan research center is located at an altitude of 6,000 feet in the Kulu valley, on a famous ancient road to Ladak and Tibet. The mountains on each side of the valley range from 10,000 to 14,000 feet in altitude and at the north end of the valley attain a height of about 20,000 feet. With the climate ranging from the subtropic to the alpine, it is confidently expected that a considerable number of species of plants characteristic of the region, at least those from higher altitudes, when once introduced and established, will thrive under the climatic conditions characteristic of the vicinity of New York City.

At the Himalayan Research Institute are being assembled a reference library, geological and archaeological material, and working collections representing the fauna and flora of the western Himalayan region. Laboratories for intensive research in bio-chemistry, pharmacology, and cancer are now under construction. Some of the objectives in the field of plant science are a comprehensive investigation of the medicinal uses and properties of plants, and a study of the ethnobotany of the region. Basic to these studies, however, is the proper identification and classification of the material; it is particularly in these fields that The New York Botanical Garden can best serve the Himalayan Research Institute and its parent, the Roerich Museum of New York. While no member of the staff of The New York Botanical Garden has an intensive knowledge of the flora of the western Himalayan region, I, fortunately, have a distinctly wide knowledge of the general flora of Asia and of the immense mass of botanical literature appertaining to this, perhaps the richest of all floras, as far as the several continents are concerned. It has thus been possible to supply identifications for most of the material so far collected and transmitted for study, although it has involved the expenditure of a very considerable amount of time on my part to familiarize myself with what has actually been accomplished in the past on the flora of the region.

The services of The New York Botanical Garden were first enlisted in an attempt to locate some experienced individual to direct the biological field work and to supervise the building up of the natural history collections at Naggar. After a considerable amount of correspondence, Doctor Walter N. Koelz, of the University of Michigan, was recommended to Doctor Roerich, in due time was appointed staff member of the Himalayan Research Institute and reported for duty at Naggar at the end of May, 1930.

Immediately upon his arrival in India, Doctor Koelz energetically commenced field work, spending the first season in the Lahul district, much of the material collected by him in this region being from altitudes of from 10,000 to 12,000 feet. From time to time he has transmitted to The New York Botanical Garden sets of duplicate botanical specimens for study and seeds for propagation. Within the past year somewhat in excess of 2,000 identifications have been made for him, his current collections being

studied, named, and reported with as little delay as possible. This system is mutually advantageous to both institutions, as prompt identifications are supplied to the Institute and the reference collections of the Garden are enriched by important collections made by Doctor Koelz. Collections so far received cover all groups of flowering plants, ferns and fern allies, mosses, hepatics, lichens, and fungi. Fortunately, the herbarium of The New York Botanical Garden contains a fairly representative set of duplicates of the older British India collections from the time of Wallich and his contemporaries, these collections having been made in the first half of the last century, and also a large series of plants collected by Dr. R. R. Stewart in the western Himalayan region, 1917 to 1921. Again, our library is particularly rich in the basic publications pertaining to the flora of the entire region.

The Himalayan Research Institute has already established its own serial in the *Journal of Urusvati Himalayan Research Institute*. Volume 1, No. 1, issued in 1931, contains a series of papers, reviews, etc., reflecting activities in the various fields in which the institution is interested. It is hoped that this coöperative work instituted within the past year between the Roerich Museum of New York, the Urusvati Himalayan Research Institute of the Roerich Museum, and The New York Botanical Garden may long be continued to the advantage of all three institutions.

E. D. MERRILL.

AN ACCESSION OF SPRUCE'S PLANTS FROM SOUTH AMERICA

The New York Botanical Garden has recently received as an exchange with the herbarium of Cambridge University a set of plants collected by Richard Spruce in tropical South America, numbering approximately 3,500 specimens.

In a great herbarium, the receipt of 3,500 plants would be a matter of small moment, were it not for the peculiar interest and high scientific value which is attached to this particular accession, which prompts the publication of a brief note about Spruce and his work.

Richard Spruce (1817–1893), son of a Yorkshire schoolmaster, was a contemporary of Alfred Russel Wallace, and like Wallace, early turned his attention to the biological problems of the tropics. Wallace spent four years on the Amazon before beginning his classic work in the Malay Archipelago; Spruce spent fifteen years in tropical America. Both devoted the rest of their lives to the advancement of science, Wallace primarily to problems of evolution and geographical distribution, Spruce chiefly to a study of mosses. Many of the mosses in the herbarium of The New York Botanical Garden were identified by him. His travels in South America extended over thousands of miles of river and mountain from the mouth of the Amazon at Pará to the coast of the Pacific in Ecuador and Peru.

Landing at Pará in July, 1849, he spent three months in collecting in the vicinity, before starting up the Amazon River. For nearly a year he made his headquarters at Santarem, with long and short excursions up the various tributaries of the Amazon on both sides. Late in 1850 he moved upward to Manáos and collected there for nearly another year. This was followed by eight months at San Gabriel on the upper Rio Negro. For another seven months he was at work on the Uaupes River, still farther to the west. In March, 1853, he moved on up the Rio Negro to San Carlos, making it his headquarters for twenty months, during which period he ascended the Casiquiare Canal to the Orinoco River in the vicinity of Mount Duida, explored the Pacimoni River nearly to its source, ascended the Rio Negro still farther and traveled overland to the Orinoco, which he descended as far as Maypures. By December, 1854, he was back in Manáos, and soon departed for the upper Amazon. In May, 1855, he was far up the Yurimaguas in eastern Peru. For nearly two years more he lived in the mountains of Peru at Tarapoto and collected extensively in the region. Four months were required for his next journey, down the Amazon to eastern Peru, up the Pastaza, and overland to Baños, in Ecuador, where he stayed six months before removing to Ambato. Here he spent two years in exploring the mountains of Ecuador. The summer of 1860 he devoted to a study of cinchona forests and by the end of the year reached the coast at Guayaquil. Followed two years on the coast of Ecuador, during most of which time he was in very poor health. On New

Year's Day, 1863, he sailed south into Peru and lived in the vicinity of Paita until May, 1864, when he returned to England.

Throughout this long period of years Spruce collected industriously, except when prevented by illness, which seriously interfered with the last third of his stay. The quality of his specimens was excellent: each specimen was assigned a number, its exact locality was noted, and in many cases the labels were supplemented by extensive notes in his journal, describing the habits or structural features of the plants. Possibly his interest in mosses and liverworts made him observant of small things; his collections of the inconspicuous plants of the Burmannia family, for example, have scarcely been equaled, and several of those which he discovered have not been detected since. Continuing his work at all seasons of the year, he secured specimens of many plants which a hurried traveler would have neglected. Prominent among these were many species of trees, whose flowers, high up in the forest canopy, are often difficult to see and always hard to obtain. His collections amount to some seven thousand numbers, but his memory and observation were so well developed that this great number contains comparatively few duplicate collections, and Bentham estimated that he secured no less than six thousand different species.

When his first collections reached England, it was found that they contained numerous species previously unknown to science. His later collections, particularly along the upper Rio Negro and in the mountains of Peru, were extraordinarily productive of new species.

In the last fifteen years, The New York Botanical Garden has turned its attention actively to the flora of northern South America. Naturally many of Spruce's species are included among its rapidly growing collections. To recognize these species, it has in the past been necessary to depend on a comparison of our plants with the printed descriptions of Spruce's collections, and the descriptions of that period are often incomplete and unsatisfactory. A comparison of plants with the original specimens is always far better, since it shows accurately whether our plants are actually the same as those discovered by Spruce or some other similar, but different, species. Heretofore Spruce's plants have been poorly represented in American herbaria. The best set is at

the Gray Herbarium of Harvard University, while The New York Botanical Garden has possessed but a few odd specimens. To make the necessary comparisons has involved either borrowing material or extensive traveling. With such a large set of his collections now in New York, our work on the plants of South America is very much facilitated. Without doubt, this accession of more than three thousand plants is one of the most important additions ever made to the herbarium of The New York Botanical Garden.

H. A. GLEASON.

WINTER IRIS NOTES

(a) REPORT OF THE EXHIBITS OF THE NEW YORK BOTANICAL GARDEN AT THE A. A. A. S. MEETINGS AT NEW ORLEANS, LOUISIANA, CHRISTMAS WEEK, 1931

The activities of The New York Botanical Garden among the native irises of North America was made one of the many features at the New Orleans meeting of the American Association for the Advancement of Science during Christmas week, 1931.

The undersigned was entrusted with the execution of the plan comprising the following five items, for the instruction of the public and constructive publicity for the Garden. Appreciation on the part of the Garden of the help afforded by friends, and the appreciation of the public of the exhibits is recorded in some of the following paragraphs.

I. *Exhibit of fourteen tubs of native Louisiana iris plants in flower, with appropriate show labels.*

The fourteen tubs of iris plants prepared in advance failed to come into flower, but proved to be excellent examples of the vigorous foliage of the Louisiana irises, the leaves ranging from three to four feet tall. Eight of these fourteen tubs were put on exhibit, together with two tubs of irises in flower secured from a private garden in the city. These groups of irises opened several flowers each day during the exposition.

The plants in the fourteen tubs are now (January 9th) beginning to show the flower-stalks. It is planned to make a special exhibit of these at an appropriate place in New Orleans when they do flower.

II. *Exhibit of original water-color paintings of Louisiana irises (species and varieties), with appropriate show labels.*

These paintings, showing shades of all the colors, were an outstanding exhibit of the exposition. Many of the scientific exhibits were viewed by the public with great interest, but no other was so unusual, elegant, and attractive as this exhibit of paintings to which in frequent cases the same people came back day after day.

III. *An exhibit of the iris numbers of Addisonia and the separate published colored plates of the Louisiana species, together with a set of the iridaceous papers by the undersigned, published in the* JOURNAL *of the Garden the past two years.*

This exhibit proved of great interest to both general plant-lovers and horticulturists, and also to botanists. It evoked both numerous inquiries as to how to obtain the iris numbers of *Addisonia* and requests for copies of the reprints of the iridaceous papers from the Garden JOURNAL.

IV. *Exhibit of an excerpt (preprint) of the iridaceous matter in the forthcoming "Manual of the Flora of the Southeastern United States" with appropriate cover, appearing as "Contribution from The New York Botanical Garden, Number 327"*

This was of particular interest to botanists in general and to iris students in particular. It will be of especial use to the botanists and the iris students in Louisiana during the approaching iris season, for determining the numerous native species of *Iris*.

This paper is the first taxonomic treatment of the Louisiana irises growing naturally east of the Mississippi River, and its presence at the exposition elicited numerous questions about our native irises, particularly those of the lower Mississippi Delta. Seventy-six new binomials are published here for the first time.

V. *Exhibit of 150 colored lantern slides of eastern American irises on the screen, together with a public lecture in the Convention Room of the Monteleone Hotel in New Orleans on Saturday evening, January 2nd.*

Several hundred iris-interested people attended, some coming from distant points in the state. The slides of the spectacular iris flowers of the lower Mississippi Delta region were received with great enthusiasm. The slides were also viewed by smaller groups without the aid of the lantern.

In a letter to the undersigned received subsequently to the exhibit, Ethel Hutson writes that, " I cannot tell you how greatly we all enjoyed your wonderful talk on our native Iris last Saturday evening—and the beautiful illustrations. As one who has loved these glorious blossoms for 27 years, ever since I first saw the field of them that used to cover the old rice-field on the Gentilly Road, I want to express my personal appreciation of all you have done, and my delight that some one has at last done what I have longed to do, but could not for lack of time and ability—made a study of them and also had their beauty recorded in color. I envy Miss Eaton the privilege of making those drawings!

" We owe a special debt also to you and Mr. Alexander for the 'Botanical Interpretation of the Iridaceous Plants of the Gulf States,' which will be such a tremendous help to us all in identifying any that we find. I am hoping to find among the vinaceous sorts the 'liver-colored' kind that is so abundant in my yard, and which seems to stand drought and watering with the limy hydrant water better than the more showy types."

The exhibits were very favorably commented on generally by those who saw them and received newspaper publicity generally through the interest and activity of May Wilkenson Mount, writer and lecturer, and organizer of the Louisiana Iris Society, whose object is to create interest in and preserve the irises of the lower Delta of the Mississippi River. Much of this publicity is now running and will continue to run indefinitely in the newspapers of the country.

Thanks are due George Thomas, of the New Orleans Parking Commission, and E. A. Farley, of the Gentilly Terrace Nurseries, for interest in and aid for the exhibits. For the flowering plants of iris we are indebted to Mrs. Charles Arthur Wallbillich.

In an official report on the scientific exhibits at the Municipal Auditorium it is recorded in reference to the exhibits of The New York Botanical Garden, " that between 15,000 and 20,000 people enjoyed your exhibit . . ."

(b) New Year's Observations on Iris

Incidentally, during the last week of December and the first week in January, we continued our observations on the iris growth in the vicinity of New Orleans.

FIGURE 1. Growing plants, but at almost complete rest, of *Iris Thomasii* as they appear in July and August. (Slightly reduced.)

FIGURE 2. Plants of *Iris Thomasii* from the same colony as those shown in FIGURE 1, as they appear in December. Four months hence will find the colony in flower. (¼ natural size.)

Out-of-season flowering had not been unusual towards the end of the year 1931. Exceptionally fine specimens of *Iris fulva* had flowered in the garden of R. A. Bazet at Houma in October and November, some of the flower-stems producing five and six flowers, and, later on, large well-formed fruits. Colonies of several of the species of the *Vinicolor* group of iris were in flower in the gardens in various parts of New Orleans in December. The groups from Mrs. Wallbillich's garden exhibited at the Auditorium were the latest ones to flower, and opened their latest groups of flowers on December 31st and they maintained their perianths expanded for three days.

The iris plants in the bayous, ditches, swamps, and marshes were well under way for next spring's flowering season. The plants of the various species had developed their leaves to lengths varying from six inches to three feet.

Thus, the irises were well over their annual resting period, one of their peculiarities referred to on former pages of the JOURNAL OF THE NEW YORK BOTANICAL GARDEN.

A concrete example of this rather peculiar resting habit of Louisiana irises is to be found in *Iris Thomasii*. The plants of this species make leaves two to three feet long during the flowering season, together with flower-stalks up to three feet. While the fruits are maturing, the leaves dry up and fall off the rootstocks. Just after this period, August, after the leaves and the flower stalks have gone, the leaves for the following flowering period, which is about eight months hence, appear, and grow half an inch to an inch in length. Then the roots fall off the rootstock, and the plant takes a complete rest, the rootstocks lying loose in the ground. (See FIGURE 1.) Later in the fall the plant becomes active and by the end of the year the condition shown in FIGURE 2 obtains. Growth continues gradually and in April the plants may be found in full flower.

The lower Mississippi Delta irises all show a strong tendency, sometimes with a conspicuous example like that cited above and shown in the accompanying figures, to rest after the summer fruiting season, but *Iris Thomasii* perhaps is an extreme example of this striking habit among our irises, and apparently one not recorded previously to our observations.

JOHN K. SMALL

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FACTORS TO BE CONSIDERED IN INTERPRETING LOUREIRO'S SPECIES[1]

There are certain types of botanical publications that since their date of issue have caused constant difficulties to systematists, partly because of inadequate, inaccurate, and indefinite descriptions; partly because of errors in interpretation of morphological characters; partly because of the misuse of technical terms; and partly because of the fact that in some cases no botanical material was preserved for future study, or, if preserved, has since been destroyed.

Loureiro's Flora Cochinchinensis, issued in 1790, is an outstanding representative of this type of publication. In this work he described 185 new genera and 630 new species from a very wide geographic range, extending from China to tropical East Africa, but mostly from Indo China and China. He also misinterpreted some scores of genera and several hundred species proposed by earlier authors; and on the basis of these descriptions his successors, unfortunately, proposed hundreds of new binomials, with no other available data than those given by Loureiro. Scores of generic names and hundreds of binomials, all of more or less doubtful status, thus encumber taxonomic literature on the basis of this single publication.

Some botanists take the attitude that these binomials of doubtful status should be ignored; others accept them as representing species of doubtful status; while others make a serious effort to interpret them. In referring to the pioneer botanical work accomplished by missionary priests in the 18th and first half of the 19th centuries, including Plumier, Loureiro, and Blanco, A. de Candolle states: "Il est à regretter que ces révérends ecclésiastiques ne se soient pas contentés d'écrire des homélies. Bonnes on les aurait lues, mauvaises on les aurait mises de côté; tandis qu'en histoire naturelle l'existence de certains noms et de certaines planches rend nécessaire de consulter indéfiniment les plus mauvais ouvrages."

João de Loureiro, S. J., was born in Lisbon in 1710 and proceeded to Cochinchina in 1742, where he remained until Decem-

[1] Abstract of a paper presented at the monthly Conference of the Scientific Staff and Registered Students of The New York Botanical Garden held on November 12, 1931.

ber, 1777, with the exception of a short interval spent in India. In 1778 he proceeded to Canton, China, and returned to Lisbon in 1781, where he resided until his death in 1791. Finding that missionary activities were restricted in Cochinchina, he entered the service of the king of Cochinchina as chief mathematician and naturalist. He was apparently influenced in undertaking his extensive botanical activities because of difficulties encountered in securing drugs known to and used by Europeans, and he naturally turned his attention to native drug plants. He had no training in botany, yet with no botanical library other than copies of Linnaeus' Genera Plantarum, Systema Naturae, and Philosophia Botanica, supplemented by certain other literature after his return to Portugal, he produced a standard work, which, even if it does contain numerous errors, also contains much that was new to botanical science of the time. How many men of our age and time could do as well with such limited means?

Of the 1298 species that he actually described, 697 were from Cochinchina, 254 from China, 292 from both Cochinchina and China, 29 from tropical East Africa, 9 from Mozambique, 8 from Zanzibar, 5 from India, and 1 each from the Philippines, Sumatra, and the Malay Peninsula. Unlike certain other authors of early botanical literature, notably Blanco, he prepared botanical specimens representing species that he described. In 1774 he sent 60 specimens to Europe and in 1779 an additional shipment of 230 specimens; these are for the most part now preserved in the herbarium of the British Museum. On his return to Portugal Loureiro must have taken with him a fairly representative herbarium, probably containing material representing most of the species that he described. A. de Candolle (La phytographie 429. 1880) on the basis of a letter from Gomes states that Loureiro's herbarium at Lisbon, being in a very bad state of preservation, was destroyed; yet Gomes in writing in 1865 does not mention this, although he discusses the Loureiro collections in Paris and London and enumerates 37 plants from Loureiro then preserved at Lisbon (Mem. Acad. Sci. Lisboa, Cl. Sci. Mor. Pol. Bel.-Let. n. s. 4: 26. 1872). De Candolle further states that Geoffroy Saint-Hilaire secured 83 specimens from the Loureiro herbarium in Lisbon in 1808 which were deposited in the herbarium of the Paris Museum. Lasègue (Mus. Bot. Delessert 548. 1845) notes

that at that time the Academy of Science at Lisbon possessed Loureiro's herbarium except a very small part which was to be found in Paris. In an anonymous article (Flora 43: 207–208. 1860) the statement is definitely made that when Lisbon was captured by the French in 1807, Marshal Junot ordered Loureiro's herbarium and the other botanical material preserved in the collections at Lisbon to be packed and transported to Paris, and that his receipt for the material was preserved in Lisbon. This author assumes that as no one at the Museum of Natural History in Paris knew anything about the collections, other than the small part mentioned above, it was very probable that the Loureiro herbarium had been destroyed in transit. Thus of nearly 1300 species described by Loureiro, less than one third are now represented by extant specimens.

In 1919, as a result of a rather intensive study of Loureiro's descriptions, it was found that a high percentage of his doubtful genera and species could definitely be placed. An extensive manuscript was then prepared, in which an attempt was made to determine the status of all forms described. It was felt, however, that publication of the results would be unwise until additional data could be secured from an examination of Loureiro's extant types, and through field work in those regions where he secured most of his material. Within the past three months a considerable amount of work has been done on this project, bringing the manuscript of 1919 up to date. Fortunately, within the interval, extensive collections of plants have been secured from the vicinity of Canton, where Loureiro lived for several years, and two large and important collections have been made by Mr. and Mrs. Clemens and by Mr. Roy Squires in the general vicinity of Hue, Anam, where Loureiro lived for thirty-five years and in which region most of his Indochina botanical collections were made. Extensive notes on Loureiro's extant specimens are available, and I have had the opportunity of examining some of the types in the herbarium of the British Museum.

In determining the status of Loureiro's species one has to take into consideration the known flora of his classical localities and in connection with such material and the very extensive literature one must make an intensive study of each individual description, including not only the botanical characters but also the native

names, indicated habitats, and economic uses. One has constantly to keep in mind that Loureiro's descriptions are often faulty, owing to his misinterpretation of certain morphological characters and his misuse of certain technical terms. Frequently, where he misinterpreted a genus or species proposed by his predecessors, the exact status of the form that he described can be determined by the process of elimination. Often the native name, the habitat, and the indicated economic uses supply the clue as to what Loureiro intended to describe. One must constantly be on his guard in assuming that Loureiro was correct in placing his species in certain genera; he was more often wrong than right. In some Linnaean genera, such as Juglans, he placed representatives of three different families. One has also constantly to be on his guard in reference to Loureiro's unfortunate practice of describing a species from a flowering specimen and then, or at a later date, adding fruit characters to make his description conform to the characters of the Linnaean genus in which his species was erroneously placed. It must not be inferred that all of Loureiro's work was bad; many of his descriptions are complete, accurate, and are even better than the majority of those published by his European contemporaries.

It is confidently expected that, as a result of the study now being made, practically all of Loureiro's genera can be placed, and the status of the vast majority of his species as well as the very numerous substitute binomials proposed by later authors on the basis of his original descriptions can likewise be fixed. Incidentally, twelve years ago, when this study was commenced, somewhat in excess of twenty of Loureiro's genera were so imperfectly understood that no botanist had succeeded in placing them in their proper families, although in a number of cases the type specimens were actually available for study. Only one or two now remain as of doubtful status.

In the meantime practically all of the genera and species that Loureiro described in 1970 have been redescribed by other authors under other binomials. If strict priority be followed in reference to Loureiro's generic names, in from thirty to forty cases those proposed by him in 1790 would automatically replace those proposed by later authors. Fortunately, this upset in nomenclature is unnecessary for those who follow the provisions of the Inter

national Code of Nomenclature, as the later names have been conserved by official action by various botanical congresses. There will of necessity be a few changes in accepted specified names, but the number of such changes is surprisingly small when one considers how little was known regarding the flora of tropical Asia in 1790, and how well it is known at the present time.

E. D. MERRILL

A GLANCE AT CURRENT LITERATURE[1]

Emulsions of oil penetrate leaves more slowly and therefore do less injury than sprays made of pure oil, Joseph M. Ginsburg points out in a study on the oil penetration from spray into plant tissues, in the September 1 number of the *Journal of Agricultural Research*. Though some injury always seems to follow, the use of oil sprays in controlling orchard pests is of such value that it is important to try to find a harmless oil, the author says. Oil may keep out sunlight, he believes, by absorbing certain light rays.

Further studies of oil sprays are given by E. R. de Ong, Ralph H. Smith, and Frank B. Herbert in the *Journal of Economic Entomology* for October.

* * * *

Plants may actually die of thirst during the winter, declares *The American Home* for November, in an article by E. Bade. Directions are given for the protection of many of our common perennials.

* * * *

Budgeting the garden and its equipment is the subject of another article in the November *American Home*. Under the title, "How Much Garden to Buy?" Romaine B. Ware analyzes carefully the wants and needs of the average gardener, and adjusts them to his spending power.

* * * *

A tropical jungle on the edge of civilization is charmingly described and pictured in *Beautiful Florida* for October. The

[1] All publications mentioned here—and many others—are available in the library of The New York Botanical Garden, in the Museum Building.

area referred to is the McKee Jungle Gardens on Dixie Highway, just south of Vero Beach.

* * * *

"Big Trees" by Walter Fry and John R. White, both of whom are connected with Sequoia National Park, is, perhaps, the second volume to be devoted entirely to these still-living giants of an earlier age. The authors tell how they were once widely scattered over the earth, but are now confined to the western slope of the Sierra Nevada range in California. Then chapter by chapter they relate the life history of these trees, telling finally of the need and means for their preservation.

* * * *

American Forests for November reports the dedication of the tallest of the Big Trees to the three founders of the Save-the-Redwoods League –Dr. John C. Merriam, Dr. Henry Fairfield Osborn, and Madison Grant. The issue also gives the story of Galen Clark, discoverer of Mariposa Grove.

* * * *

Algae, ferns, horsetails, and conifers, as well as records of animal life, are found in fossil form on Staten Island, Dr. Arthur Hollick reports. His "Records of Triassic Fossils on Staten Island, N. Y.," reprinted from the Staten Island Institute of Arts and Sciences, has recently been issued as Contribution 325 from The New York Botanical Garden.

* * * *

Among the new publications reviewed by *The American Botanist* for October are "Common Names of Plants and Their Meanings" by the editor himself (Willard N. Clute); "Pocket Lens Plant Lore" by James Small; "My Nature Book" (observations in Florida, done in the style of Thoreau) by W. S. Blatchley; "If I Were to Make a Garden" by E. H. Wilson; a new edition of "Landscape Gardening" by O. C. Simonds; "Mushrooms, Ferns, Grasses, and Some More Wildflowers" by James Edward Jones; a new magazine, *Garden Digest,* published at Pleasantville, N. Y., and four new volumes issued by Macmillan—"Adventures in Suburban Gardening," "The Modern Nursery," "Peonies," and "California Gardens."

Fashions are changing in vegetable varieties, Adolph Kruhm tells us in *The American Home* for January, 1932. He mentions, for example, the new Oxheart tomato, with solid flesh, Chinese cabbage, which only recently has been raised successfully and made popular in this country, Giant Red celery, the Tendersweet carrot, Golden Wedding corn, with large, sweet ears, "V C." peas, with pods eight inches long, and broccoli, among other newly developed products.

* * * *

Bermuda may look like merely a winter resort to the traveler —or the place from where onions and lilies come to the stay-at-home. But we are more dependent than we think on the products of the islands. Agricultural exports to the United States in 1930 amounted to more than half a million dollars' worth of vegetables. And this was in addition to 5,508 cases of Easter lilies. Ten thousand bushels of onions were exported.

* * * *

Watering orchids properly in winter is an important part of their care. *The Orchid Review* for December outlines the needs of various species. The deciduous and semi-deciduous ones need little water during the resting period. Some, in fact, such as the Thunias and deciduous Calanthes, want none at all. The evergreen bulbous orchids should be watered moderately, letting the soil get wholly dry before additional moisture is applied. Others take varying treatment, each according to its own requirements. The Odontoglossums of the *crispum* type, for instance, need an abundance of water.

* * * *

Iris is used in Italy in medicines, perfumes, and cosmetics, and vast fields of the flower are grown for these purposes. Most of the October 15 issue of the Italian perfume journal, *Rivista Italiana delle Essenze e Profume,* is devoted to an illustrated article describing the culture and commercial uses of iris.

* * * *

"Life-Forms of Terrestrial Flowering Plants" is the title of a study by G. Einar Du Reltz just published by Upsala University. It opens with a discussion of theories of plant forms dating from 300 B. C. to 1841 A. D., then illustrates such forms as vines of various sorts, succulents, cushion plants, shrubs, and others, as they are considered today. More will follow in a later publication.

A further study of the rose black-spot fungus is reported by Dr. B. O. Dodge in *Mycologia* for November-December. Some species of rose, says Dr. Dodge, seem resistant, while others are highly susceptible to this disease, which is recognizable by the black spots on the leaves.

* * * *

"Beans—A Guide to Seed Growers" is a practical, illustrated booklet for gardeners, written by T. F. Ritchie and published by the Dominion of Canada Department of Agriculture. It is designated as Bulletin 153 of the new series.

* * * *

A treatment for poison ivy suggested by Dr. Maynard M. Metcalf in *Science* for December 18 is as follows: For two patches about the size of a silver dollar, take a hundred pinches of absorbent cotton. One at a time, dip them into a saucer of alcohol, wipe over the affected surface, and immediately destroy the cotton. Do not let the alcohol dry on the skin. Eventually, rub the skin hard instead of merely wiping it. If blisters have formed, rub them until they break. The alcohol dissolves the varnish-like poison of the ivy, and thus removes it.

* * * *

Some of the botanical results of the Tyler-Duida expedition of 1928-29 are reviewed in the *Bulletin of the Torrey Botanical Club,* in a series of articles by Dr. H. A. Gleason, beginning in May. G. H. H. Tate, zoölogist and leader, brought back about 200 hitherto unknown species of plants, several of which are of unusual taxonomic, morphologic, or phytogeographic interest. The American Museum of Natural History has presented these specimens to The New York Botanical Garden.

* * * *

How prehistoric forest growth is determined by pollen grains found in peat today is told by G. Erdtman in a recently issued reprint from the *Journal of Ecology* for February, 1931. The peat deposits date from late Quaternary times. The methods used in locating the pollen grains are described in a reprint from *Science* for April 10.

* * * *

"Early Evolution of the Angiosperms" is the title of a fascinating study by H. Hamshaw Thomas in *Annals of Botany* for

October, 1931. He shows how seed-pods may have developed from leaves, and tells how the flowering plants of today probably came to be, illustrating his theories with sketches. He points out how the birds, flower-visiting insects, and angiosperms all developed about the same time, making a great change in the earth's flora.

* * * *

Fire blight of pears and apples, its causes, symptoms, and methods of control, is the subject of Pamphlet No. 138, new series, of the Dominion of Canada Department of Agriculture. G. C. Chamberlain is the author.

* * * *

The final summary of his work on diseases of lilies is given by C. E. F. Guterman in a reprint from the Yearbook of the Horticultural Society of New York. A description of various diseases, with the treatment for each, is given.

* * * *

"Where does hooded barley come from?" Harry C. Harlan attempts to answer the question in a report of a hooded mutation that developed during some of his experiments. In the *Journal of Heredity* for September he says, "Our guess is that hooded barley appeared as a mutant in a naked mountain barley of Nepal or West China not more than 150 years ago."

CAROL H. WOODWARD

DR. STOUT CONTINUES HIS STUDIES OF THE AVOCADO

Dr. A. B. Stout is spending February and March in southern Florida in further studies of flower behavior and fruit production in avocados. The remarkable and hitherto unknown type of flower behavior seen in these plants was investigated by Dr. Stout, first during a year (1922-1923) spent in California and later (1925) during a period of study in Florida.

The maturity of the pistils and stamens in the flowers of avocados is so highly specialized that the trees of a clonal variety function only as one sex in the forenoon and only as the other sex in the afternoon a condition called synchronous daily dichogamy.

Furthermore, the various seedlings and clonal varieties fall into two main classes: (A) those that are pistillate (female) in the forenoon and staminate (male) in the afternoon, and (B) those that are staminate in the forenoon and pistillate in the afternoon. Thus there is reciprocation between varieties in respect to the daily sequence that provides for cross-pollination and makes this more or less necessary for fruit formation. Two of the reports which discuss and illustrate this remarkable condition have appeared in the publications of the Garden (Jour. N. Y. Bot. Gard. **25**: 1–9. Ja 1924; Mem. N. Y. Bot. Gard. 7: 145–176. Mr 1927).

The particular flower behavior of each variety grown, the relation of such behavior to fruit production, the extent to which cross-pollination is necessary for the production of adequate and maximum crops of fruit, and the kind of interplanting which may be most effective in yielding such crops are all matters of vital importance to the most successful culture of avocados. It is the solution of these problems which is being sought.

The present studies are being made in coöperation with the Department of Botany of Miami University, the officials and horticultural agencies of Dade County, Florida, and the Agricultural Experimental Station of Florida.

NOTES, NEWS, AND COMMENT

Dr. E. D. Merrill, Director-in-Chief, has been appointed one of an International Standing Commission of seven to consider the urgent needs of botanical taxonomy and the necessary financial support therefor. The other members of the Commission are Mr. A. D. Cotton (London), Prof. Dr. L. Diels (Berlin), Prof. Dr. R. E. Fries (Stockholm), Dr. H. M. Hall (Stanford University), Prof. Dr. R. Maire (Algeria), and Mr. J. Ramsbottom (London).

Four parts of North American Flora were published by The New York Botanical Garden during December. The treatment of plant-rusts, by J. C. Arthur, begun in 1907, was completed by the

issue of a host-index; this part (Volume 7, Part 13) does not, however, finish the volume. The first three parts of Volume 18, commencing the family Cyperaceae, are devoted chiefly to about two fifths of the vast genus *Carex*, by K. K Mackenzie.

At the last meeting of the Botanical Society of America in New Orleans the Mycological Section voted the establishment of an independent mycological society. Dr. William H. Weston, of Harvard University, was elected President and Dr. H. M. Fitzpatrick, of Cornell University, Secretary. A committee of five, including the officers mentioned, was also appointed to draw up constitution and by-laws and negotiate with The New York Botanical Garden looking toward an agreement whereby *Mycologia*, now published by The New York Botanical Garden, can be adopted as the official organ of the newly formed Mycological Society of America. The results of these negotiations will be reported at the first meeting in Atlantic City held in connection with those of the American Association for the Advancement of Science next winter.

ACCESSIONS

LIBRARY ACCESSIONS, MARCH 1–SEPTEMBER 1, 1931
(CONTINUED)

LEHMANN, ERNST, & AICHELE, FRITZ. *Keimungsphysiologie der Gräser (Gramineen); eine Lebensgeschichte des reifenden, ruhenden und keimenden Grassamens.* Stuttgart, 1931.

LEMÉE, ALBERT MARIE VICTOR. *Dictionnaire descriptif et synonymique des genres de plantes phanérogames.* Vol. 3. Brest, 1931. (Given by the author.)

LEVIER, EMILE. *Compte rendu [sur les] plantes à fourmis de l' archipel indo-malais et de la Nouvelle Guinée, par Oroardo Beccari.* Turin, 1885.

MCCULLY, ALICE WOODRUFF (ANDERSON). *American alpines in the garden.* New York, 1931. (Given by The Macmillan Co. 1931.)

MAXIMOW, NICOLAS ALEXANDROVIČ. *The plant in relation to water; a study of the physiological basis of drought resistance.* Authorized English translation. Edited with notes by R. H. Yapp. London, 1929.

MONARDES, NICHOLAS. *Joyfull newes out of the new founde world . . . englished by John Frampton, merchant, anno 1577, with an introduction*

by Stephen Gaselee. 2 vols. London, 1925. (Given by Dr. J. H. Barnhart.)

NAGA, T. *Bankwa Zukan.* [*Pictures of Japanese flowers.*] 8 vols. [1930.] (Given by Dr. N. L. Britton.)

NILSSON-EHLE, NILS HERMAN. *Spaltöffnungsstudien bei schwedischen Sumpfpflanzen.* Lund. [1914.]

PHILIPSON, JOHN. *The vitality of seeds found in the wrappings of Egyptian mummies.* [Newcastle.] 1888.

Photographs of plants (14). (Given by Dr. H. H. Rusby.)

PRAEGER, ROBERT LLOYD. *Open air studies in botany: sketches of British wild-flowers in their homes.* London, 1897.

PRITZEL, GEORG AUGUST. *Thesaurus literaturae botanicae.* Editio nova. Lipsiae, 1872. ["Obraldruck" reprint.]

RADDI, GIUSEPPE. *Di alcune specie nuove di rettili e piante brasiliane.* Modena, 1820. (Photostat negative given by Dr. J. H. Barnhart.)

———. *Quarante piante nuove del Brasile.* Modena, 1820. (Photostat negative given by Dr. J. H. Barnhart.)

RIDLEY, HENRY NICHOLAS. *The dispersal of plants throughout the world.* London, 1930.

SACCARDO, PIER' ANDREA. *Sylloge fungorum omnium hucusque cognitorum.* Vol. 25, pars 10. Curante Alex Trotter. Abellini, 1931.

SJÖSTEDT, L. GUNNAR. *Litoral and supralitoral studies on the Scanian shores.* Lund [1928.]

———. *Revision of some dubious Swedish Ceramium types, their classification and ecology* Lund, [1928].

———. *Studien über die Periodizität der Zellteilung und sich daran enschliessende Erscheinungen.* Stockholm, 1921.

THEOPHRASTUS ERESIOS. *Enquiry into plants and minor works on odours and weather signs, with an English translation by Sir Arthur Hort* 2 vols. London, 1916.

VALLIN, HERVID. *Ökologische Studien über Wald und Strandvegetation.* Lund, [1925].

WEHMER, CARL. *Die Pflanzenstoffe; . Bestandteile und Zusammensetzung der einzelnen Pflanzen und deren Producte: Phanerogamen.* Ed. 2 Vol. 2. Jena, 1931.

WERNISCHECK, JAKOB. *Genera plantarum.* Vindobonae, 1764.

LIBRARY ACCESSIONS FROM OCTOBER 1–DECEMBER 31, 1931

BRITTEN, JAMES, & BOULGER, GEORGE SIMONDS. *A biographical index of British and Irish botanists.* Ed. 2. Ed. by A. B. Rendle. London, 1931.

CHAMBERLAIN, CHARLES JOSEPH. *Elements of plant science.* New York, 1930.

FITZPATRICK, HARRY MORTON *The lower fungi: Phycomycetes.* New York, 1930.

International Address Book of Botanists. London, 1931. (Given by Dr. E. D. Merrill.)

KOSTYTSCHEW, SERGIUS, & WENT, FRIEDRICH AUGUST FERDINAND CHRISTIAN. *Lehrbuch der Pflanzenphysiologie.* Vol. 2. Berlin, 1931.

MAXIMOW, NICOLAS ALEXANDROVIČ. *A textbook of plant physiology* . Translated from the Russian by A. E Murneck and R. B. Harvey. New York, 1930.

MILLER, EDWIN CYRUS *Plant physiology with reference to the green plant.* New York, 1931.

MOLISCH, HANS. *Populäre biologische Vorträge.* Ed. 2. Jena, 1922.

MORRIS, ROBERT TUTTLE. *Nut growing.* Rev. ed New York, 1931. (Given by The Macmillan Co.)

MOUILLEFERT, PIERRE. *Traité des arbres & arbrisseaux, forestiers, industriels et de ornament cultivés ou exploités en Europe et plus particulièrement en France.* Texte and atlas. Paris, 1892–1898.

NEES VON ESENBECK, CHRISTIAN GOTTFRIED DANIEL *Genera et species Asterearum.* Norimbergae, 1833. (Given by Dr. J. H. Barnhart.)

PETER, ALBERT *Wasserpflanzen und Sumpfgewächse in Deutsch-Ostafrika* Berlin, 1928.

PETERSEN, ELLY. *Taschenbuch fur den Kakteen-freund.* Ed. 3. Esslingen und München, 1930.

SALMON, WILLIAM. *Pharmacopoeia londinensis; or, The new London dispensatory in VI books.* Ed. 2. London, 1682. (Given by Dr. J. H. Barnhart.)

SASAKI, SYUN'ITI. *A catalogue of the government herbarium.* Taihoku, Formosa, 1930. (Given by Dr. E. D. Merrill.)

TSCHIRCH, ALEXANDER. *Handbuch der Pharmakognosie.* Ed. 2. Lief. 1–9. Leipzig, 1930–31.

VEATCH, ARTHUR CLIFFORD. *Quito to Bogotá.* London, 1917. (Given by Dr. J. H. Barnhart.)

WILLIAMS, FRANCIS XAVIER. *Handbook of the insects and other invertebrates of Hawaiian sugar cane fields.* Honolulu, 1931. (By exchange.)

PUBLICATIONS OF

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Memoirs of The New York Botanical Garden. Price to members of the Garden, vols. I–VI, $1.50 per volume; to others, $3.00. Vol. VII, $2.50 to members; to others, $5.00.

Vol. I. An Annotated Catalogue of the Flora of Montana and the Yellowstone Park, by Per Axel Rydberg. ix + 492 pp., with detailed map. 1900.

Vol. II. The Influence of Light and Darkness upon Growth and Development, by D. T. MacDougal. xvi + 320 pp., with 176 figures. 1903.

Vol. III. Studies of Cretaceous Coniferous Remains from Kreischerville, New York, by A. Hollick and E. C. Jeffrey. xiii + 138 pp., with 29 plates. 1909.

Vol. IV. Effects of the Rays of Radium on Plants, by Charles Stuart Gager. viii + 478 pp., with 73 figures and 14 plates. 1908.

Vol. V. Flora of the Vicinity of New York: A Contribution to Plant Geography, by Norman Taylor. vi + 683 pp., with 9 plates. 1915.

Vol. VI. Papers presented at the Celebration of the Twentieth Anniversary of The New York Botanical Garden. viii + 594 pp., with 43 plates and many text figures. 1916.

Vol. VII. Includes New Myxophyceae from Porto Rico, by N. L. Gardner; The Flower Behavior of Avocados, by A. B. Stout; Descriptions of New Genera and Species of Plants Collected on the Mulford Biological Exploration of the Amazon Valley, 1921–1922, by H. H. Rusby; and The Flora of the Saint Eugene Silts, Kootenay Valley, British Columbia, by Arthur Hollick. viii + 464 pp., with 47 plates, 10 charts, and 11 text-figures. 1927.

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THE NEW YORK BOTANICAL GARDEN
Bronx Park, New York, N. Y.

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Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

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JOURNAL OF THE NEW YORK BOTANICAL GARDEN

OUR ROSE GARDEN
B. O. DODGE

LLARETA, A STRANGE FUEL
H. H. RUSBY

THE INSTITUTIONS FOR THE STUDY OF BOTANY IN BUCHAREST
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A GLANCE AT CURRENT LITERATURE
CAROL H. WOODWARD

SPRING COURSES AT THE NEW YORK BOTANICAL GARDEN
FORMAN T. MCLEAN

THE NEW YORK BOTANICAL GARDEN FLORICULTURAL ASSOCIATION

PUBLIC LECTURES DURING MARCH, APRIL, AND MAY

CONFERENCE NOTES FOR DECEMBER AND JANUARY
A. B. STOUT

NOTES, NEWS, AND COMMENT

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THE NEW YORK BOTANICAL GARDEN

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OUR ROSE GARDEN

BLOOMING PERIOD FOR THE CLIMBERS

Our rose garden occupies a rather secluded situation in the park. Nevertheless, from the first warm days of spring, when the new foliage is coming out, until the last blooms are frozen in November, this corner of the grounds has its many daily visitors. The summer of 1931 was not an unfavorable one for our roses. There is always plenty of moisture at this point. Of the 100 varieties of hybrid teas in the central planting, 48 were in bloom on June 1. On this date only three varieties of climbers, Carmine Pillar, Sea Gull, and Star of Persia, showed flowers. By the middle of June 73 more varieties of climbers were in bloom, leaving such as Dorothy Perkins, Elizabeth Ziegler, Excelsa, Flame, and Hiawatha to open with the first day of summer. Not counting freak buds that come out as a second blooming, the average period from the first to the last bloom was 20 days for the 109 varieties of climbing roses which we have. This period should be reduced by about a week because the last blooms may hang on some time without being much of an attraction. Paul's Scarlet Climber seemed to be the favorite last year. Perfectly colored flowers were to be seen for a month, beginning June 5. Coralie (FIGURE 1, center), Thelma, Purple East, Victory, General John Pershing, and Star of Persia were among those which attracted a good deal of attention last year.

PRUNING THE CLIMBERS

It is the practice here to begin pruning these climbers sometime in August. With the exception of such types as Dr. W. Van

Fleet, Ben Stad, and Auguste Roussel, there is usually enough new wood at this time to warrant cutting out all of last year's wood. Five or six new canes are selected and strongly tied with raffia to the cedar poles. As many as eight or ten bands are often used. No loose ends of branches are left to switch in the winds during the winter. Such a method of pruning is particularly suitable for roses in this setting, and we have no trouble in keeping down mildew and black spot even though the roses are surrounded by the woods, so that air drainage is not very good. At the left, in FIGURE 1, are shown a few pole roses just after they had been pruned and tied up. The old canes which had been cut out are in the piles. At the center is a picture of the rose Coralie taken June 13. At the right there are shown similar roses in August just before they were pruned.

CONTROL OF BLACK SPOT AND MILDEW

Three years have now passed since our first report on "Fungous Diseases in the Rose Garden."[1] Some new varieties have been introduced since then and further work on disease control has been carried on. The commercial preparation composed largely of ammoniacal copper carbonate, which was used in 1928, will control black spot and mildew very well in most cases as stated in that report. It must, however, be applied regularly at least every five days and more frequently in rainy weather. We have discontinued its use for two reasons. Although no spray stains or direct injury ever showed on the foliage, there seems to be a sort of stunting effect on the plants due perhaps to the accumulation of certain injurious substances in the soil. We have found that dusting with "green sulphur," either with or without arsenate of lead, is less expensive, less troublesome, and more effective as a control. Some persons observing the results of our experiments insist that the plants are actually stimulated directly. This may or may not be true. If the dusting is done properly the foliage shows no trace of the powder unless the leaves are examined with a hand lens.

One thing is clear from this work. If a variety like Mrs. Henry Bowles, which is rather susceptible to black spot, is protected one season, not only do the plants grow better and flower

[1] Journ. N. Y. Bot. Gard. **30**: 105–124. 1929.

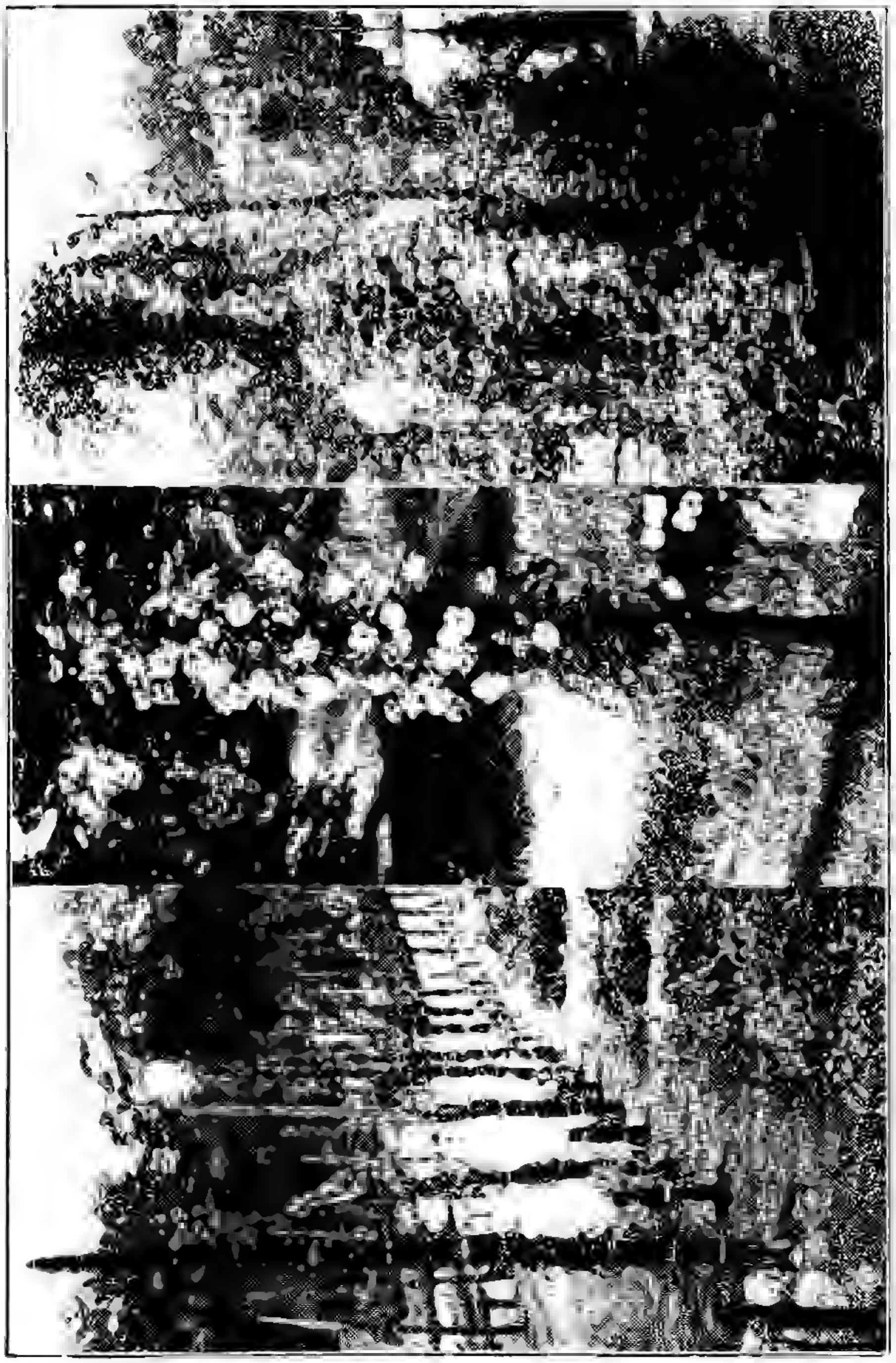

FIGURE 1. The pruning of pole roses.

better that season, but the next year's growth is much stronger. The experiment of dusting the plants in one half of a bed, leaving the others unprotected (*l.c.*, p. 121), has been extended to include several more varieties. In some cases the plants dusted the one year would not be dusted the next, and vice versa. The benefits would be even more striking if the same plants were protected year after year, the parasite being allowed to run its course in the other half of the bed. The same thing is true in case of mildew.

All of the plants in a bed of Grange Colombe were protected during 1928 and 1929 so that they were in good condition in the spring of 1930. As soon as the foliage was well out in 1930 the plants in the left half of the bed (FIGURE 2, above) were dusted once a week with Pomo-green, which is a mixture of a fine grade of dusting sulphur and arsenate of lead. The plants shown at the right in this picture were not dusted. The photograph was taken on November 17. During August and September and until heavy frost the plants that had been dusted retained their foliage and blossomed freely, while the plants not so protected lost most of their leaves in July and August and produced few flowers thereafter.

With the opening of the season of 1931, the plants in the right half of this bed were dusted regularly once a week and those at the left (FIGURE 2, below) were not dusted, thus reversing the experiment of 1930. After the new foliage came out and new canes grew up, one could see that the plants that had been protected the previous year were at least a third taller and in a much healthier condition. This difference continued to show until the latter part of July. That is, for a time in the early part of the season the plants that were being protected were not in as good condition as those not being protected. Black spot, however, soon came on and began to defoliate the plants not being dusted, so that from August 1 on, comparatively few blossoms showed in this part of the bed. The plants shown at the right (FIGURE 2, below) kept on improving in appearance and vigor until heavy frost. This photograph shows the condition of the plants on September 22. The contrast between the two halves of the bed was more noticeable in October and November. Having proved that dusting roses with this fine "green sulphur" is

highly beneficial, further experimenting with these beds will not be necessary.

Spray Schedule

The schedule which is now being carried out for the protection of the hybrid teas and the hybrid perpetuals against black spot, mildew and brown canker, consists first in applying commercial lime sulphur, dormant strength, 1:9, just before the plants are hilled up with dirt for winter protection. This also insures against the infestation of the plants with rose scale. If the spraying is done before the plants seem fully dormant the solution is diluted to about 1 to 16 for safety.

As soon as the foliage is well out in the spring, green Kolodust is applied once a week. This should be done when there is little wind and the foliage is dry. Later on, when caterpillars begin to appear, Pomo-green, which contains arsenate of lead, is substituted.

In 1930 we tried waiting until black spot and mildew appeared on many varieties before beginning the dusting. This practice is certainly not to be recommended as it is much easier and less expensive to control these diseases by preventive measures, which merely means applying the dust earlier. There are certain varieties like Grange Colombe, Los Angeles, Lady Margaret Stewart, and Mrs. Henry Bowles which are particularly susceptible to black spot. It is well to dust these varieties twice a week during a rainy season. Our bed of Los Angeles was brought through the season of 1931 with scarcely a single spot in this way.

Although most of the climbing roses are somewhat subject to mildew at times, a few applications of green Kolodust or Pomo-green at critical times will keep it down. Certain kinds, like Star of Persia, are very susceptible to black spot. If it is not thoroughly protected it is always defoliated early in the season. The growth will then be weak and few blossoms will form next year. Under protection, Star of Persia grows rather vigorously, so that it is now becoming one of our most beautiful early bloomers.

Brown canker, which some few years ago was doing much damage to the hybrid perpetuals here, has been practically eliminated by pruning out cankered canes and applying the same

fungicides which have been used to combat mildew and black spot.

When rose aphids appear in June the plants are sprayed with a solution of Black Leaf 40, 1 : 1000, to which fish-oil soap, about four or five pounds to the 100 gallons, has been added. The soap is first thoroughly dissolved in boiling water. It is usually necessary to repeat this spray about a week later and again in early fall. For home treatment use one teaspoonful of Black Leaf 40 to a gallon of water, to which an ounce or a cubic inch of soap which has been dissolved in hot water has been added. The sprayer should be cleaned after using. There are nicotine dusts on the market which can be used against aphids. Where the dust contains free nicotine it is recommended to dust when the temperature is high.

We are not particularly troubled with the common rose bug. Some think this may be due to the frequency with which the soil about the roses is stirred up, thereby destroying the eggs. The Japanese beetle, which is doing much damage to roses in back-yards near the Botanical Garden, has not yet found its way in noticeable numbers to our rose garden, only an occasional beetle being found last summer.

The one great problem which confronts the average person who tries to protect his plants against disease and insects is that of obtaining a duster or sprayer which works satisfactorily and easily. There are a few fan dusters on the market which are very satisfactory for large rose gardens. Very few of the small pressure dusters which work with a plunger are much good, however. They are usually wasteful and difficult to operate. Recently we have obtained an inexpensive hand duster of either one-quart or two-quart capacity (FIGURE 3). It is very light and easily operated. It seems to work perfectly and is very economical in the use of dust.[2] With the assurance that hybrid teas need not all die out after two or three years, those who would like to grow roses in their home gardens will buy more rather than fewer plants.

SOIL CONDITION AND BLACK SPOT

Professor C. T. Gregory of Purdue University writes that

[2] The names of the manufacturers or dealers who can supply such dusters will be given on request.

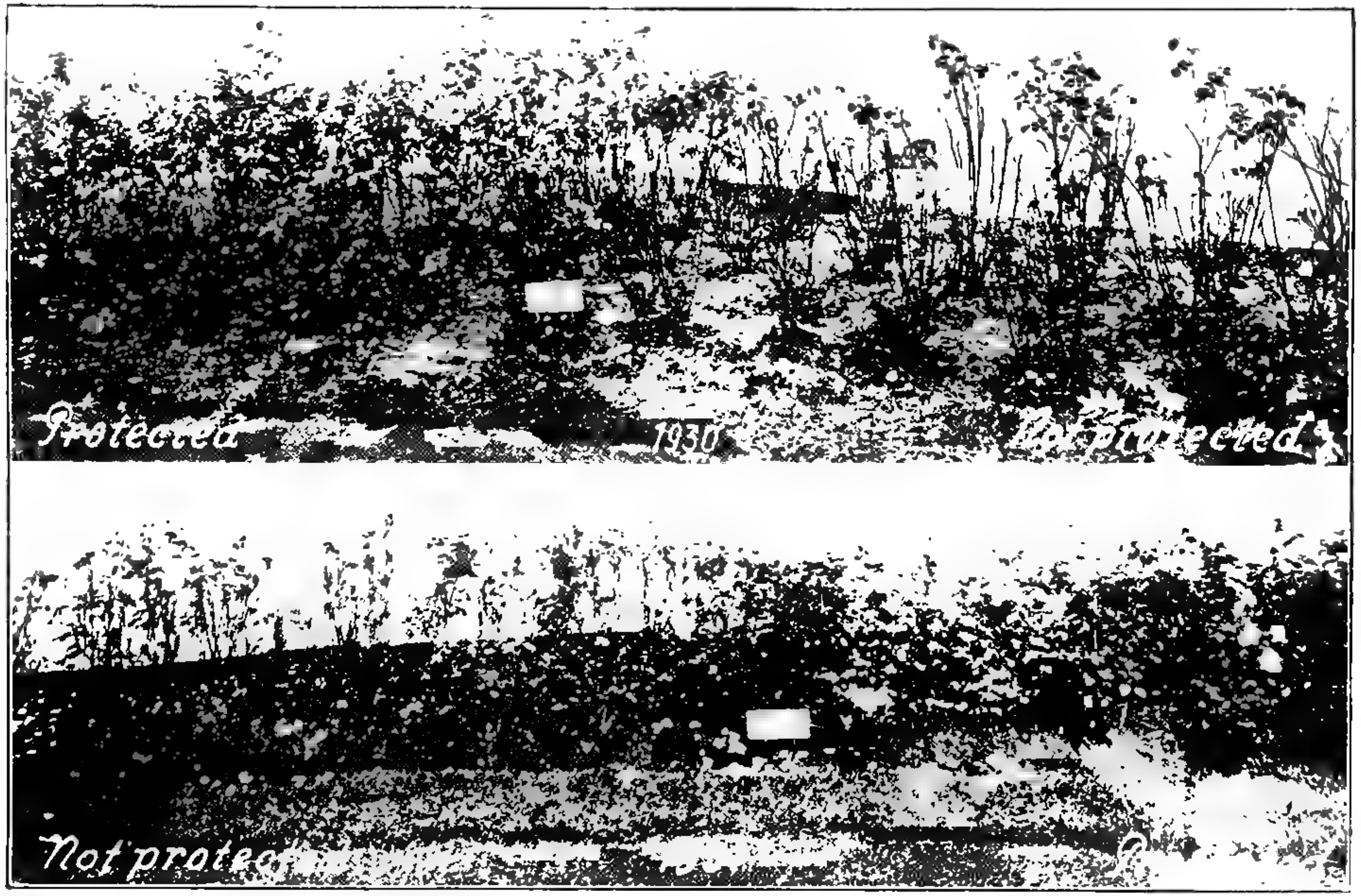

FIGURE 2. Effects of protection against black spot.

black spot is causing a lot of trouble in rose houses in Indiana, but adds that the florists are controlling it 100 per cent by applying commercial fertilizers at the rate of about two tons per acre every twenty-one days, sometimes alternating with cow manure. They also water heavily once in two weeks with lighter waterings in between. This refers to roses under glass. Whether we have the whole story here or not, there is certainly some correlation between the health and vigor of certain varieties and their susceptibility to black spot.

Two beds of Hortulanus Budde side by side in our garden showed very different amounts of defoliation due to this disease. The plants in one bed were not only losing most of their leaves but they appeared to be stunted and sickly otherwise. On digging down to test the soil a bed of coal ashes about one foot thick was found buried about eighteen inches below the surface. It seems that the ashes had been buried there in an attempt to dry out the soil, but no drainage out from the ashes had been provided. The plants of the variety Frau Dr. Erreth, which formerly grew in this bed, were replaced in the bed after the ashes had been buried there, but they evidently died out the next spring. The new planting of Hortulanus Budde to take their place did very well in this bed the first year, the records show, but they declined the second year and were considerably infected with black spot. Several additional applications of the sulphur dust were necessary last year to control the black spot. In spite of this a number of plants died out. It will probably be necessary to replace most of the others next spring. The same variety in the other bed nearby required no additional care, remaining fairly free from the disease under the scheduled treatment.

Leaf Chlorosis

Dr. R. P White has recently published an interesting paper on "Chloroses of the rose."[3] He describes a type of rose disease referred to as mosaic which is said to be due to a virus easily transmitted by budding. This is to be distinguished from chloroses due to malnutrition. Certain varieties of roses regularly fail to do well in our garden, yet when the same kinds are grown elsewhere they make fairly vigorous growth. Our Mrs. Charles E. Russell is showing more and more just such mottling of leaves

[3] Phytopathology **22**: 53–69. 1932.

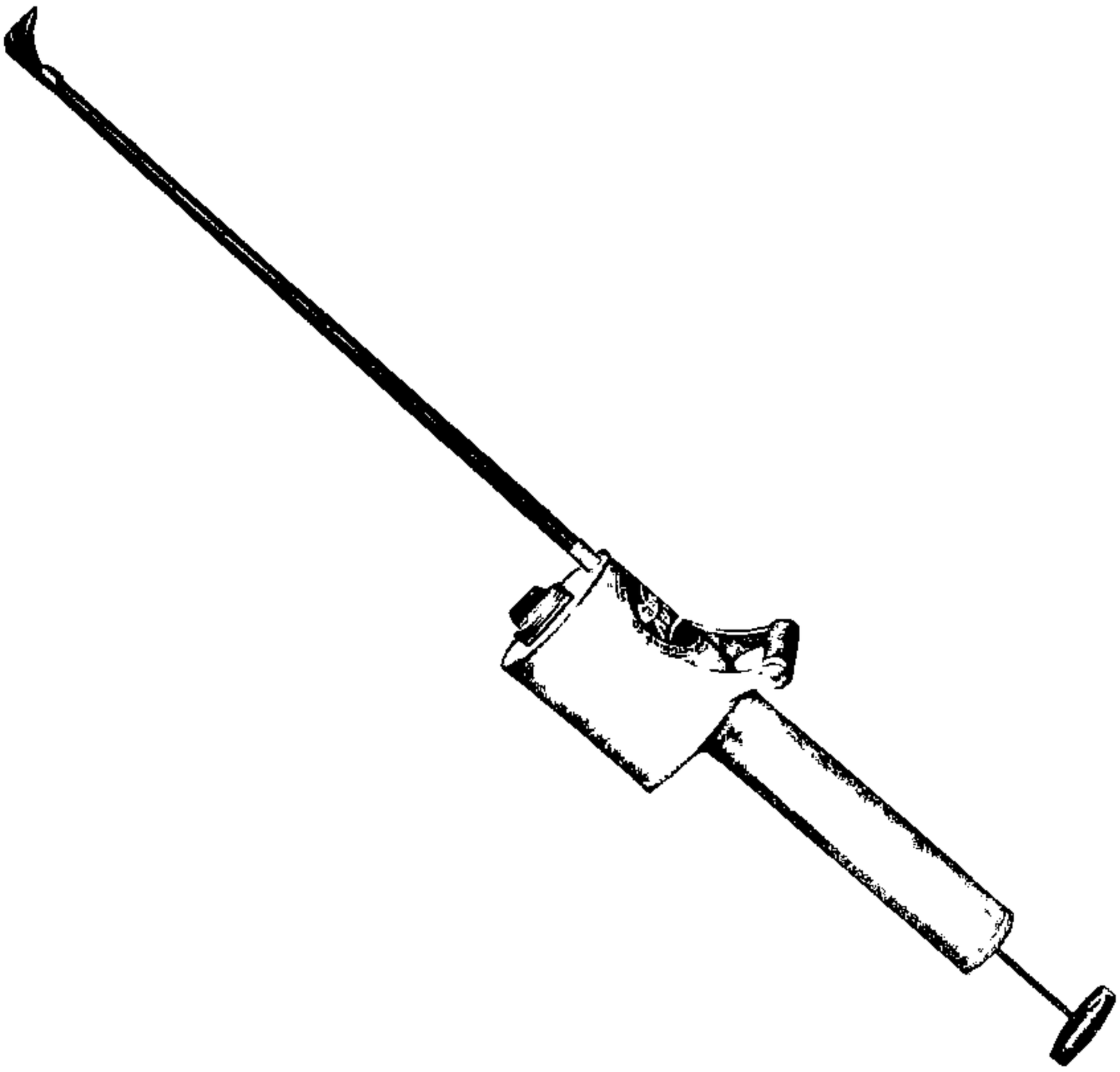

FIGURE 3. An efficient hand duster for roses.

as pictured for the Premier variety by Dr. White in his figure 4, p. 62. Our plants of the Premier variety are not particularly vigorous either. This trouble White refers to iron or lime chlorosis. It is said to be frequently due to an excess of lime in the soil. Ramsbottom of England says that if one works iron sulphate in the soil it will be very beneficial in such cases. The same symptoms may, however, be due to other soil troubles.

The variety Kaiserin Auguste Viktoria, which is a noted rose, never does well in our central planting. It is very subject to a cane borer which works down from the pruned ends of the canes. The soil in this bed may not be particularly suitable for this variety.

Dr. P. W. Zimmerman and others of the Boyce-Thompson Institute for Plant Research are working on problems of fertilizing soil for roses. No doubt we shall have more definite information on this subject in the near future.

B. O. DODGE.

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LLARETA, A STRANGE FUEL

In crossing the plains of the higher Andes, at almost any point between Colombia and Chile, one is likely to encounter a landscape thickly dotted with what appear to be rounded and moss-covered stones, their surfaces of a beautiful dark-green color. What will strike him as peculiar is the fact that other stones, abundant on the intervening surfaces, have no such covering, being of the ordinary shades of gray and brown, though often exhibiting a growth of gray lichens. If he should chance to remark, as did the present writer, on the strangeness, or the beauty of this mossy growth, he might be invited to strike his axe into one of them, when he will find it to consist of a more or less solid, though not hard, mass of wood. Further examination will show him that the supposed stone is a much condensed shrub, arising from a thick, woody, more or less central root, and having its erect branches and branchlets so tightly crowded together that they have become essentially a loosely solid mass of wood, often exceeding a foot in height and two or three feet in breadth. The result of this habit of growth is the production of a peculiar columnar or crystal-like structure of the mass, which splits very readily, but is decidedly tough in cross-section. In the natural growing position of the plant, none of this woody structure is visible, since the surface is regularly rounded outward and downward, until it meets the very surface of the earth on all sides, so as to resemble a convex green cushion, resting on the ground. The plant is the *llareta* (*Azorella diapensioides*) a member of the Umbelliferae.

Examining its green surface, we find it to consist of innumerable little branchlets or twigs, about twenty-five to the square inch, about one fourth inch in length, and crowded together almost as closely as the cells of the honey-comb. The tip of each twig bears a densely imbricated rosette of minute green leaves, underneath which are the dead remains of those of former seasons. By the annual elongation of these twigs, the area of the surface is necessarily increased, with the resulting separation of the twigs from one another, and with decreased compactness of the surface, whereupon the twigs successively branch, thus maintaining the solidity of the mass.

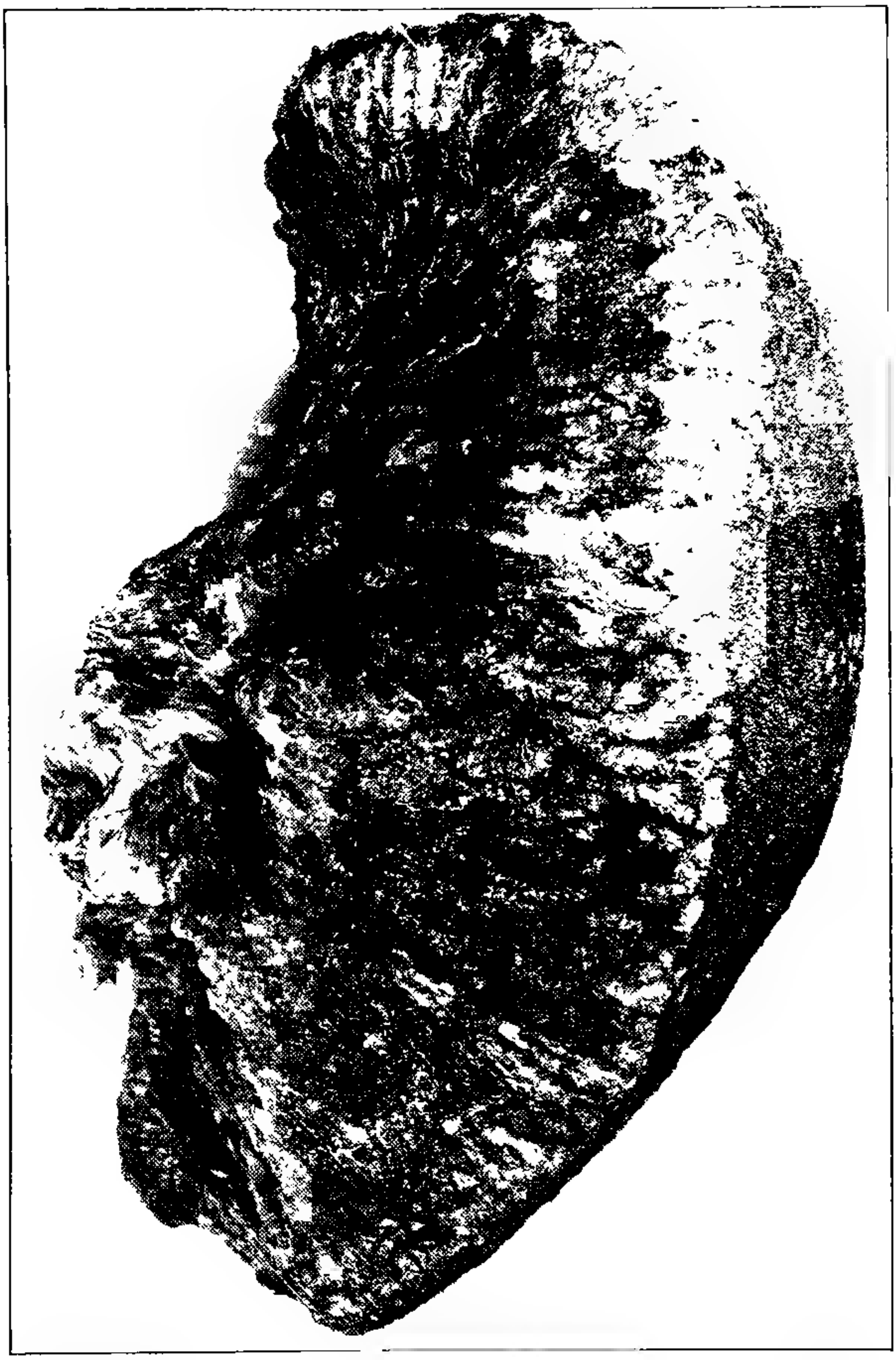

FIGURE 1. The *llareta* (*Azorella diapensioides*), a woody, umbelliferous plant from treeless regions in the Andes. It is successfully used for fuel by the natives. About four fifths the natural size.

FIGURE 2. The exposed ends of the close-set branches of the *llareta* (*Azorella diapensioides*) are well shown in this picture, about twice natural size.

On the arrival of the flowering stage, only a part of the surface functions, one or more branches developing, while the rest of the surface retains its usual appearance; at least, this has been the case, so far as I have observed the process. The twigs of this

flowering branch take on a greatly accelerated growth. The minute leaves of the rosette increase considerably in size, become thickened, recurved and rigid, and in the center of the rosette the flowers and fruits appear. So great is this change in appearance that one finding such a branch detached from the plant would probably not recognize its origin.

No account of the germination, growth, and development of this plant from the seed has been published, so far as I know. The subject would present features of great interest.

The altitudes at which these plants grow are not only treeless, but almost devoid of shrubs of the ordinary forms and dimensions, so that fuel is extremely scarce, at the same time that the need for it is exceptionally great. Where obtainable, the *llareta* furnishes the chief reliance for fuel. Being a member of the family Umbelliferae, it is more or less oily, burns well, and yields considerable heat. On the railroad from Arequipa to Puno, I have seen the locomotive tenders filled with this material for use in their furnaces.

H. H. Rusby.

THE INSTITUTIONS FOR THE STUDY OF BOTANY IN BUCHAREST[1]

Bucharest, being the capital of Roumania, is naturally the cultural center of that country. Its facilities for the advanced study of botany are many. I shall describe here only the most important ones.

In order to understand better the activities of the Roumanian students in this field, it would be best to describe first the organization for the study of biology, and therefore of botany, in the Roumanian schools.

After the first four years in the elementary grade, the student begins the secondary school. This lasts over a period of eight years, during which time he acquires a general knowledge in both scientific and literary studies. In botany, the courses con-

[1] Abstract of a paper presented before the Monthly Conference of the Scientific Staff and Registered Students of The New York Botanical Garden, held December 16, 1931.

sist mainly of anatomy and physiology, and less of taxonomy. A knowledge of the fundamental laws of biology is acquired from the study of the entire group of natural sciences, a study which is obligatory in all the secondary schools. After the eight years of this general education in the secondary school, the student receives the degree of "bacalaureat."

From this point on, the student who enters the university in order to study botany must first take up certain prescribed subjects, eleven in all, before beginning to specialize in his branch. These courses, which last over a period not less than four years, are all accompanied by the necessary laboratory practice and give the student a sound basis for a future specialization in any branch of the natural sciences. It might be of interest to enumerate these prescribed subjects. They are general physics, organic and inorganic chemistry, descriptive zoölogy, botanical anatomy and taxonomy, biological chemistry, animal morphology and histology, animal physiology, plant physiology, mineralogy, geology, and palaeontology.

After these four years at the university, the student acquires the degree of "Licencié" in Natural Sciences which seems to be about the equivalent of the master's degree in America. From this point on, the specialization begins. To obtain a doctor's degree, further study and original research are required in the particular subject, over a period of at least two years and under the direction of a specialist.

The study and specialization in botany can also be made at the agricultural colleges. There is, however, a difference between these and the universities in their scope as well as in the manner in which they are organized. Both belong to the state. The universities are under the direction of the Department of Public Instruction and aim to educate the future research workers from among whom the university professors are recruited. The agricultural colleges are under the direction of the Department of Agriculture and their aim is to produce not only good students and scholars, but also good agriculturists. The courses given in these schools incline somewhat to the practical side. Aside from the subjects of general agricultural interest there are definitely prescribed courses for the study of botany. These are agrology, plant breeding, plant anatomy, taxonomy, genetics, plant physi-

ology, and plant pathology. These also lead to the equivalent of the master's degree.

In Bucharest, the university courses in the botanical subjects are given at the Botanical Garden. This institution comprises a building two stories high in which are located the laboratories, the museum, and the conservatory rooms. Since the war the number of students has increased to such an extent that the spaces allotted to some of the departments are quite inadequate. The number of plant species cultivated in the open as well as in the greenhouses has rather diminished lately, as have also the relations and exchanges with the other countries.

The laboratory of anatomy and taxonomy is conducted by the director of the garden, Professor M. Vladescu. It is being used not only by the students of botany but also by those of medicine and pharmacy. The assistants organize from time to time excursions to different parts of the country for taxonomical studies.

The laboratory of plant physiology, situated in the same building, is entirely independent of the other units. Its director, Professor E. C. Teodorescu, prepares his assistants in their didactic activities and also suggests and oversees their research work.

Plant cytology is not studied to any considerable extent in the University Botanical Laboratories. It is better represented in the Zoölogical Laboratories.

Botanical research is extensively conducted also in the College of Agriculture. In close relation with this institution is to be found the Institute for Agricultural Research of Roumania, whose foundations were laid only a few years ago. Its laboratories will be installed in a very large edifice which is now being built and will be endowed with libraries and apparatus according to the latest demands of modern knowledge and technique. This institution has branches in the other university centers and is in close relation with all the lower agricultural schools in the country. Large experimental grounds are placed at the disposal of the different sections of the Institute.

The relation between the College of Agriculture and the Institute of Agricultural Research is made closer by the fact that nearly every professor of the College of Agriculture is the chief of the corresponding section in the Institute.

rockeries, azalea gardens, trained fruit trees arranged in combination with flowering borders, grouping of evergreens, etc.

"Exhibition groups of rare plants or such plants that although not rare are not well known and are very adaptable for home grounds and other interesting motives.

"These permanent exhibitions shall be open to garden clubs, horticultural students and professional men, and to all those who are interested in horticulture and floriculture, and should offer them an opportunity to study plant life and get a better understanding of the decorative possibilities of plants."

Membership is open to florists, professional and amateur gardeners, seedsmen, nurserymen, park superintendents, editors and writers for horticultural journals, and all who are allied with garden clubs and horticultural organizations, as well as other individuals who may be interested in the objects of the organization. No dues are to be exacted, but each member is expected to make a voluntary contribution.

Through an informal agreement with the Association, the Botanical Garden has invited the Association's particular coöperation in developing a tract of about five acres of land in the northern part of the grounds. The Garden has offered to prepare the soil for planting and to furnish the necessary assistance for the proper maintenance of the area and its plantings. The Association, on the other hand, has offered to install the initial plantings and to provide necessary supervision afterwards. The duration of the agreement is indefinite, and it is understood that it may be terminated at any time by one month's written notice on the part of either party to the agreement. It is further understood that in event of the termination of the agreement all material supplied by the Association shall revert to such donors as may not wish to donate it to The New York Botanical Garden. It is agreed that the activities of the Association are not to be conducted along commercial lines, but that members are to receive proper credits for their exhibits by having their names and addresses appear in connection with such exhibits. It is fully understood that control of the grounds and of all the activities within the Garden reservation is retained by the Garden management, with the Director-in-Chief as its responsible representative. Applications for membership in the new Floricultural Association may be addressed to The New York Botanical Garden, Bronx Park, New York, N. Y.

PUBLIC LECTURES DURING MARCH, APRIL, AND MAY

Following is the program of free illustrated lectures given in the lecture hall of the Museum Building of The New York Botanical Garden on Saturday afternoons at 3:30. Doors are closed at 3:30; late-comers admitted at 3:45; lectures close promptly at 4:30.

March 5. "Iris of Eastern United States," Dr. John K. Small, Curator.

March 12. "Swamps, Ancient and Modern," Dr. Arthur Hollick, Paleobotanist.

March 19. "Something Old and Something New," Mrs. Wheeler H. Peckham, Honorary Curator of Iris and Narcissus Collections.

March 26. "Conspicuous Plants of Hawaii," Mr. George T. Hastings, Theodore Roosevelt High School.

April 2. "Flowers of Trees," Dr. Forman T. McLean, Supervisor of Public Education.

April 9. "A Garden of Herbs," Mrs. Helen M. Fox, Author of "Garden Cinderellas" and "Patio Gardens."

April 16. "Spring Wild Flowers," Dr. John Hendley Barnhart, Bibliographer.

April 23. "Diseases and Pests of Flower Gardens," Dr. B. O. Dodge, Plant Pathologist.

April 30. "Iceland and Arctic Lapland," Dr. Clyde Fisher, Curator of Visual Education, American Museum of Natural History.

May 7. "Wild Flower Conservation," Dr. Marshall A. Howe, Assistant Director.

May 14. "Food Plants of the American Indian," Dr. A. B. Stout, Director of Laboratories.

May 21. "Vegetable Parasites that Attack Man," Dr. Rhoda Benham and Dr. Chester W. Emmons, College of Physicians and Surgeons, Columbia University.

May 28. "Fungi, Edible, Poisonous, and Otherwise Interesting," Dr. Fred J. Seaver, Curator.

CONFERENCE NOTES FOR DECEMBER AND JANUARY

Monthly conferences of the scientific staff and registered students were held in December and January. At the conference in December, Dr. B. O. Dodge spoke on "The Possibility of Hormone Action in Sexual Reproduction in the Monilia Bakery Mold." The substance of this paper was published in the December 1931 number of the *Bulletin of the Torrey Botanical Club.* Miss Alice Aronescu read a paper on "The Institutions for the Study of Botany in Bucharest" which is printed on preceding pages of this number of this JOURNAL.

At the conference in January there were reports from the members of the staff who attended the meetings of the American Association for the Advancement of Science and the Botanical Society of America in New Orleans:—Dr. E. D. Merrill, Dr. H. A. Gleason, Dr. F. J. Seaver, and Dr. John K. Small.

A. B. STOUT.
Secretary of the Conference.

NOTES, NEWS, AND COMMENT

Dr. Glen Gardner Hahn and Mr. Theodore T. Ayres, of the Division of Forest Pathology of the Bureau of Plant Industry, who are stationed at the School of Forestry of Yale University, at New Haven, spent several days early in February in the mycological herbarium of The New York Botanical Garden. They were studying especially certain Discomycetes that are parasitic on coniferous trees.

Meteorology for January. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 50° F on the 7th; *73° on the 14th*; 60° on the 18th; and 57° on the 30th. The minimum temperatures recorded were: 28° on the 11th; 29° on the 12th; 31° on the 19th; and *21° on the 31st.* The total precipitation for the month was 3.79 inches. Traces of snow fell on the 10th.

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Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 41,700 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural, and forestal subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

Contributions to the Garden may be deducted from taxable incomes.

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SOMETHING OLD AND SOMETHING NEW[1]

The adage, "Something old, something new, something borrowed, something blue," used to be applied to weddings, but there is no reason why we should not use it in connection with gardens.

The oldest thing most of us perpetrate is a joke and not the worst of them was that supposed to be started in the Garden of Eden. We have a habit of calling something that does not work properly a "joke" and we look scornfully on old gardening tools and appliances and methods; but there are many of these that are better than some of the new-fangled things made only to draw pennies (and often more) out of people's pockets. We have an idea that the bathtub is an American institution and that it is new to show people in the comic papers seated in a tub enjoying some delicate repast, receiving their friends, or making startling remarks over the telephone. Ablutions in full view of a theatre audience, slipperiness of soap, etc., are really old things, and so are receptions in bathtubs in gardens with only a simple, low fence about to keep the main crush of guests off the performer! A picture in a very ancient book shows a lady reclining in such a tub, guests promenading about outside the wattle fence, a table laid out with appetizing things to eat, and a retainer in Eastern dress working a small coffee-roaster such as one still sees in general use in old French towns. The title of this charming scene is "The Joys of Life!"

I know of a Roman cistern at least two thousand years old, still serving the purpose originally intended for it—that of collecting

[1] Abstract of an illustrated lecture given at The New York Botanical Garden on Saturday afternoon, March 19, 1932.

and tempering the water from cold mountain streams to the warmer air of the valley, so delicate plants may be encouraged to grow in the best and quickest way.

Among other things still worth using are good old garden designs and plans, for a well-laid-out garden will always be satisfactory. Even if the flowering plants should gradually disappear because of neglect, the ground-plan of trees, shrubs, hedges, etc., being properly placed and spaced, will hold the pattern.

We often see in old pictures gardeners doing something we recognize as a perfectly necessary operation each year in our gardens of today. We see men grafting, we see them pruning, and we often see them holding the knife or shears wrongly, too, just as most people do today! The man who sells us secateurs at the flower-show knows they are good tools that will cut well, but he rarely is a skilled pruner, so he never tells the amateur the best way to use them, nor do lecturers; and I suppose artists, lecturers, salesmen, and hired men are the same today as they were hundreds of years ago, with the same varying value and the same old faults.

Sometimes we notice a combination of the very ancient with the most modern, and nowhere is it better emphasized than in Italy, where good telephone and trolley service go hand in hand with ancient Roman structures, and where young plants clamber over old, old ruins. In France we see it also in hundreds of ways but especially in the way olive-oil is made and in the type of baskets used for packing fruit, both dating back two thousand years or longer.

Then we come to borrowed things—plants borrowed from other countries, deliberately or inadvertently: cocoanut palms on southern shores, floated there by stormy seas; *Rosa rugosa* on islands off the Maine Coast, brought there either by waves or birds; foreign weed-seeds brought with crops or in the soil of ballast, dozens of ways.

Perhaps things went from us to other climes also, such as the famous "domus pyramidalis," a sort of tepee-like summer-house or support for climbing plants. This "domus pyramidalis" was apparently unknown in the Old World until Columbus brought the idea back with him, after which it became very popular. It seems to be used here more now by Italians (who again reintro-

FIGURE 1. "The Joys of Life." "Receptions in bath-tubs in gardens are really old things."

duced it to this part of America) than by the descendants of the early settlers, though one would think it would have remained here all the time, as it was most certainly learned by the Spaniards from the Indians. I have noticed this is used a great deal in Louisiana, and it is possible that the training of climbing plants has always been carried on here in this manner without interruption.

There is another kind of borrowing, the use of something for another purpose than that for which it was made. Some think it wonderful to be ingenious in the garden and in houses, too, and, with restraint, good things are sometimes accomplished—but what frightful effects are usually obtained! How about leaky boats sprouting nasturtiums or, again, water-boilers set in the middle of small front lawns and bursting with scarlet sage and magenta petunias? On the other hand, we have a sensible substitution to which even the most esthetic may not object. In France they use "cloches," bells of glass, to protect early planted lettuce, etc.,

from frosts; here we may use cheese-covers for the same purpose if cloches are not to be obtained or are too costly, or we may use glass battery-jars of the largest size in the same way.

In hot countries we see lath covers made in slat fashion to shade young plants. We can borrow the method of bracing them and we can use the skeleton to cover with cheese-cloth and put these screens along our newly set out tomatoes if a wind should come up and threaten to whip them about.

We come now to the blue part of the adage. Some people run to blue gardens. They can even make blue fields or woods, if they wish, by planting Scillas, as has been done at Kew, or they can have blue rock-gardens or they can often just be blue in their own garden, and they are likely to be so if they use for a ground-cover a plant that dies away shortly after blooming, such as *Mertensia virginica*, which I heard recommended by a well-known landscape architect as a cover for tulips!

In ancient tomes we see woodcuts of plants, many of which we can identify as old favorites. Thus, in John Parkinson's works of the early sixteen hundreds we can see a page of crocuses, several of daffodils, of irises, and so on. Some of these plants we still use, some we have neglected, many have been improved, new hybrids have been made from them, or special culture has made them larger or more floriferous. Mr. E. Augustus Bowles has been working for a number of years with crocuses and has produced some lovely new varieties which are now coming on the market. Some of these are Copenhagen Blue (light and dark blue), Mrs. E. A. Bowles (pale yellow), Kittywake and Bunting (mauve), Sun Bird (blue with glow of yellow), Herbert Edelsten (red-purple and white), and many others.

The narcissi we see pictured in Parkinson can, many of them, be found in old gardens today and one or two wild species can be easily recognized. *Narcissus triandrus* is certainly there and *N. Bulbocodium* also, and these, while rare in cultivation, can be procured. *N. cyclamineus* is another known over three hundred years ago, lost for most of that time, rediscovered, and now much used in hybridizing. Charming hybrids from these old species are Harvest Moon, Golden Ingot, Mrs. L. Harrison, and Trewirgie.

Wonderful things are being done abroad in the breeding of daffodils and a few people are starting here but we are far behind.

There are one or two collections now in this country that have fine modern daffodils in them; one is that of Mr. Mead at Fort Wayne, another that of Mrs. Foote of Grand Rapids. Mr. Wister has a good collection, Mr. Morrison a very choice one, also Miss Beirne of Ashland, Va., and one of the best is, I hear, that of Mrs. Davis of Nashville, Tennessee. There are some fine commercial collections, of course, but I am speaking of those being used for breeding. All these people have been allowed permits to import

FIGURE 2. Men grafting and pruning in 1625. "The same today."

good varieties, because they are doing breeding or are going to sell. It seems sad to think that the rest of us who merely want to improve our gardens and horticulture in general are prevented from having our own particular choice from the good foreign varieties. If we have a discriminating taste that will not let us grow Will Scarlett because of the wingy perianth, and, if we have money to spend, why should we not be allowed Fortune, Fortune's Gift, Fortune's Cheer, Coverack Gem, Coverack Perfection, and many others? If we desire a new and clear white double daffodil, may we be allowed to have Daphne?

But, to go back to Parkinson, among his irises we see old friends, old enemies too, and, should we look in Redouté at the beginning of the nineteenth century, we will see the dwarf bearded irises, several of them, both *I. pumila* and *I. Chamaeiris* looking just as in Parkinson and also as in our gardens. We are still recommending *Iris cyanea*, which is a form of *Chamaeiris*, as one of the best to be had among blue-purple dwarfs, and the American Iris Society is still trying to get Swertii out of our gardens, for there are flowers to be had in the same color that are far, far better.

Not only do we have old things still in use but we have new theories about plants, and we still have botanists who are switching the same old plant about from one genus to another!

And then, besides old varieties improved we have new hybrids made between different groups such as the Oncocyclus irises and Regelias that have been crossed to form the Regelio-cyclus group, the so-called Intermediate irises, first made by crossing dwarf bearded forms with tall ones, and then we have new colors in plants.

And sometimes we do find new plants too, although one would think the world had been adequately explored. Such was the case with irises in Louisiana, where Dr. John K. Small has discovered so many new species and hybrids of colors not known in that type of iris before.

And with all this there is little reason for having one's garden exactly the same as everybody's. Why is it that gardeners have to be sheep and do everything on the flock system? Let us be original, restraining ourselves just enough so that we use material that will hold its own through the ages with good contemporary taste.

ETHEL ANSON S. PECKHAM.

BEGONIAS[1]

The Begonia family is one of the most interesting and important tender-plant groups in cultivation today, comprising as it does a vast number of hybrid forms in addition to almost 500 species which are found growing naturally throughout the most tropical and subtropical regions of the earth, being especially abundant in India and in South America.

From this number the gardener can select kinds to provide a succession of bloom throughout the whole year and varieties adapted to such varied purposes as greenhouse and conservatory decoration, window or sun-room cultivation, window-box embellishment, and bedding-out in the summer garden. As greenhouse plants, various kinds can be grown in pots or hanging baskets or trained up pillars; in the open garden we have the choice of the fibrous-rooted *semperflorens* group or the larger-flowered and more exotic-looking tuberous varieties.

Botanically the Begonias form a natural group, and although widely variable, their chief characteristics are so constant that a Begonia can usually be recognized as such even by a novice in things horticultural. The flowers vary in color from pure white to scarlet and deep crimson and through every shade of yellow to richest orange. Several kinds (as *Begonia Rex*) possess very handsomely colored foliage.

The first species to be introduced to cultivation was *Begonia nitida,* which came to England from Jamaica in 1777. From then on new species were introduced from time to time until shortly after the middle of the 19th century the discovery and introduction of *B. Rex* excited great interest among horticulturists. But the great impetus to Begonia-growing came a few years later when the tuberous-rooted species began to come from South America, commencing with *Begonia Pearcei* from Bolivia in 1865. In the hands of the hybridists these species soon gave rise to magnificent large-flowered single and double forms in a rich assortment of colors, culminating in the splendid kinds we cultivate in our gardens and greenhouses today.

The year 1880 marked a most important milestone in the history of Begonias under cultivation, for in this year *B. socotrana* was

[1] Abstract of a lecture given at The New York Botanical Garden on Saturday afternoon, January 30, 1932

introduced to cultivation by Prof. Bayley-Balfour, of Edinburgh Botanic Garden. This species proved to be of the greatest value to the hybridist and was the forerunner of the two important classes of winter flowering hybrids grown today, namely, the Gloire de Lorraine types and the so-called large-flowered section, of which such varieties as Optima and Mrs. Heal are representatives. These large-flowering winter-blooming varieties resulted from crossing *Begonia socotrana* with the tuberous-rooted species and their hybrids, while Gloire de Lorraine was a result of hybridizing *B. socotrana* with the fibrous-rooted *B. Dregei.* The "Christmas Begonias," which are so popular about the festive season, belong to the Gloire de Lorraine section.

The culture of Begonias presents but few difficulties, the large winter-flowering hybrids being most exacting in this respect. The tropical species succeed best in temperatures of from 55 to 60 degrees at night during the winter months with a few degrees rise in the daytime permitted. In summer a night temperature of 75 is not too high, and this may be permitted to rise during the daytime. Other species thrive in temperatures five or ten degrees lower than these.

All enjoy moist atmospheric conditions with some shade from the strong summer sunshine but full exposure to all available light from mid-October to mid-February. Begonias are particularly impatient of drafts and sudden changes in temperature, either of which will quickly cause the leaves to fall. A plentiful supply of humus in the soil is essential and extremely good drainage should be provided, for, while Begonias require moist soil conditions, stagnant moisture spells disaster.

The fibrous-rooted species and varieties are especially well adapted to the requirements of the amateur. Of these, *Begonia Haageana, B. Thurstoni, B. semperflorens* and such rhizomatous kinds as *B. manicata, B. conchaefolia* and *B. Feasti* are to be recommended. All are easily propagated by means of cuttings of the young shoots taken in the months of April or May and inserted in moist sand, the atmosphere being kept "close," and the cuttings shaded until such time as roots are emitted.

When a good root system is developed, pot the young plants into a mixture of loam, leaf-mold (or humus) and coarse sand. Do not press the soil firmly at this time. Even at subsequent pottings

Begonias should be potted fairly lightly. Water with care, endeavoring to maintain the soil always moist but never overwet, and on the mornings of bright days lightly spray the foliage overhead with clear water.

As the plants grow they must be moved into larger pots, the size of the receptacles being increased a little at a time. In these subsequent transfers use a soil similar to that already advised except that fertilizer in the form of some old, rotted manure and Scotch soot at the rate of a six-inch pot-full to each bushel of compost may be added with advantage. When the final pots are filled with roots, systematic feeding may be commenced, using dilute liquid cow-manure alternated with weak soot-water and varied occasionally by the use of an approved commercial fertilizer.

The Wax Begonia (a common name applied to all varieties of *B. semperflorens*) in addition to being an excellent house plant is also fine for use in the summer garden and will withstand sun better than any other. It is usually grown from seed, although cuttings root readily. The seed should be sown in January or February in pots or flats containing a mixture consisting of loam, sharp sand and leaf-mold (or humus) in about equal proportions, the whole having been passed through a sieve having a quarter-inch mesh. Provide plenty of drainage in the receptacles and fill to within a little way of the top, surfacing off with a light covering of the same compost passed through a piece of fine screen-meshing, making the surface perfectly level. Water well with boiling water and allow to drain for fifteen minutes before sowing the seed.

Sow thinly and evenly. As the seed is extremely fine it should not be covered at all but merely lightly pressed into the surface with a piece of smooth, dry board, the pot or flat then being covered with glass and a piece of strong paper and placed in a warm, moist atmosphere. Examine carefully every day and as soon as the first signs of germination are apparent remove the paper and glass and gradually accustom the young plants to the light, later transplanting to other flats and then potting as advised for cuttings. These Begonias may be planted out in the garden after all danger of damage from frost is passed.

Rex Begonias can be readily propagated by taking a leaf and nicking through the junctions of the main veins with a keen-bladed

knife, the leaf then being pinned down on moist sand under similar atmospheric conditions advised for stem-cuttings. A young plantlet will arise from each incision, and when a leaf or two and a fair mass of roots is developed these may be detached and potted.

Tuberous Begonias are summer-bloomers and will succeed well in a sheltered sunny spot in the garden if the soil is moist. The amateur should purchase tubers in the spring, for raising seedlings requires much care and greenhouse facilities. The tubers may be started into growth indoors by placing them upside down in flats containing moist moss or leaf-soil (this method prevents water from collecting in the hollow crown and causing rot), and inverting them as soon as growth is well started, later potting them into three- or four-inch pots. They may be planted out in the open garden in early June or may be potted on and utilized as pot plants. A simpler method is to plant the tubers where they are to flower a week or ten days after the date when the last frost may visit the locality. If this plan is followed, they will not bloom quite so early but will produce a magnificent show through the late summer and fall.

The Christmas Begonias of the Gloire de Lorraine section do not make satisfactory house plants and should not be purchased if a permanent subject is required. They are, however, among the most decorative of all Begonias. These are usually grown from leaf-cuttings taken in November or December and many growers are of the opinion that this method is decidedly the most satisfactory, but my personal experience shows that equally good results are obtained from stem-cuttings taken in March or April and these latter are far less troublesome to root.

Plants of the larger-flowered, winter-blooming section are perhaps the choicest of all Begonias, but these test the skill of the professional gardener with every greenhouse facility at command and are quite hopeless unless they can be accorded the specialized conditions they demand. They are usually grown from basal cuttings taken in spring. After flowering is the most critical period and at this time every effort must be made to keep the foliage green as long as possible, yet only the minimum amount of water must be given, for the plants are inactive and in a resting condition at this time.

T. H. Everett.

HOUSE PLANT EXHIBIT

Special exhibits of plants recommended for house culture are now on display at the Museum Building, at Conservatory Range 1, and at Conservatory Range 2. These were arranged by Mr. Becker and include some of the most dependable plants for the living room. House plants must be resistant to dry air, to rather high temperatures, and to shading. It takes more sunlight to produce flowers than to keep foliage plants in good health. Accordingly, there are more good house plants among the foliage plants than among those that are grown especially for their flowers.

The foliage plants in the exhibit include two species of *Sansevieria, Pandanus, Begonia Rex, Zebrina pendula,* Codaeums (Crotons), Wax Palm (*Chrysalidocarpus lutescens*), English Ivy, Rubber Plant (*Ficus elastica*), *Curculigo recurvata, Gasteria, Cotyledon,* Creeping Nettle (*Helxine*), *Billbergia, Sedum,* Forked Boston Fern, *Hoya carnosa, Aloe,* and *Coleus repens.*

Two cacti, *Opuntia* and the Night-blooming Cereus (*Selenicereus*), are included, and Christmas Cactus (*Zygocactus*) and *Phyllocactus* might well be included. These, the South African *Aloe* and *Gasteria,* and the *Cotyledon* may all be regarded as desert plants; and the Sansevierias are also quite drouth-resistant. Others, like the *Billbergia* and Boston Fern are in their native haunts tree-dwellers or epiphytes, and so must be inured to occasional drouths, between rains.

In contrast, the Rex Begonias, *Coleus repens,* and Wandering Jew (*Zebrina pendula*) belong to the moist tropics.

Among the plants grown for their flowers are "Amaryllis" (*Hippeastrum*), Geranium, *Hoya carnosa* or Wax Plant, and the Everblooming Begonia, which is probably the most dependable flowering plant for the average home living-room. The *Amaryllis* is now in full bloom, before the leaves appear, and it can be so managed that it will make its main growth of foliage during the summer outdoors, in which case it can be bloomed indoors with comparatively little sunlight during the winter.

FORMAN T. MCLEAN.

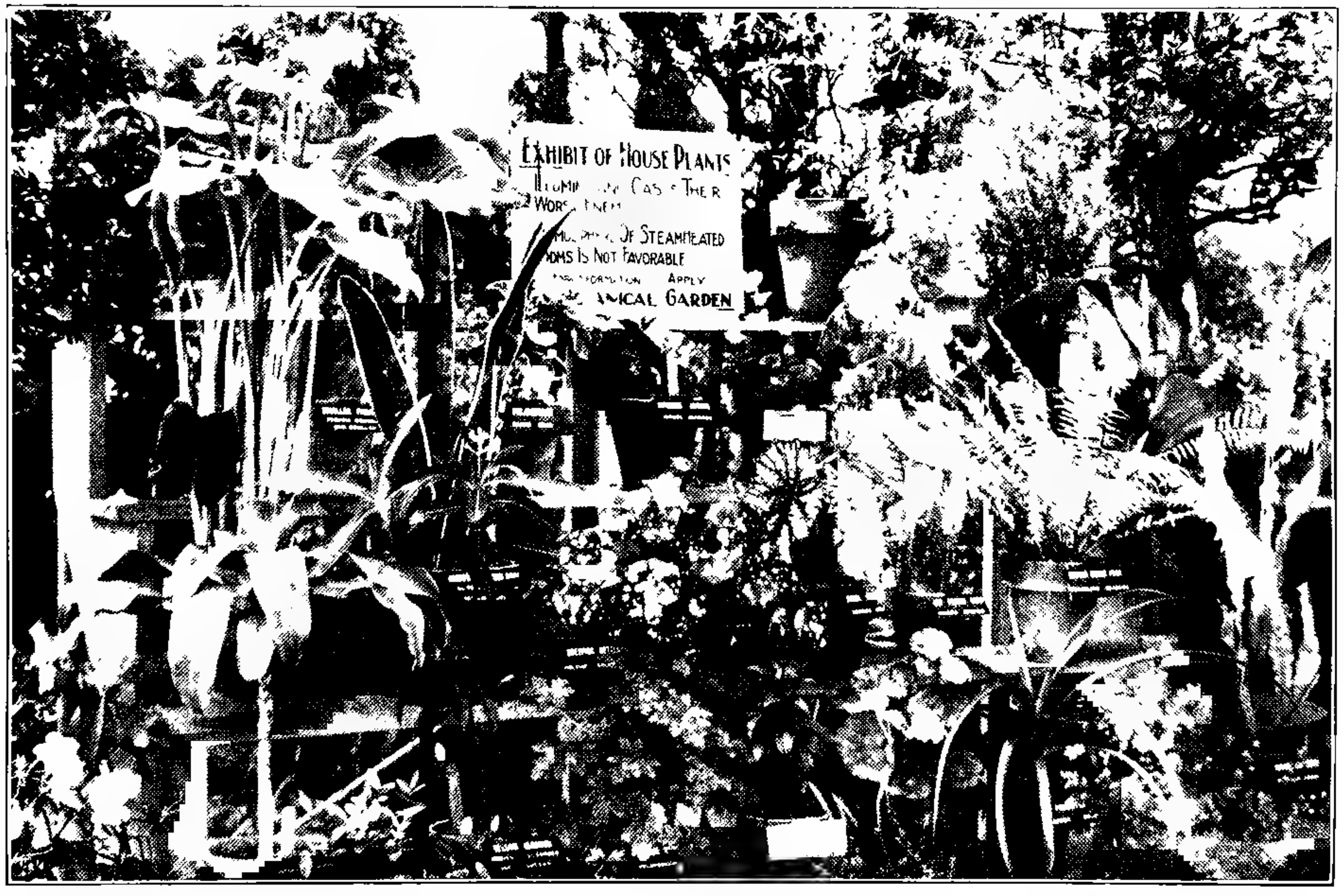

FIGURE 3. Exhibit of house plants in Conservatory Range No 2, The New York Botanical Garden. There are similar, though different, exhibits in Conservatory Range No 1 and in the Museum Building

PRACTICAL GARDENING

The course under the above title, announced in the JOURNAL for March, started March 2, 1932, with thirty-four people enrolled. Seed flats were prepared and seeds of annuals started in them. These will be grown on the bench at Conservatory Range 2 until planting time. The following topics were discussed:

SEED FLATS

The usual flat used for growing seedlings is four inches deep and a convenient size is about 12 x 18 inches. The best of them are made of cypress wood and will last for three or four years. Ordinary packing boxes can be cut down and used for seed flats, but the pine wood, from which most of them are made, rots out in one or two years. The bottom boards of the flat should be spaced about one quarter inch apart to allow for drainage. If these chinks are too wide it will be necessary in filling the flats to cover them with bits of broken crocks, leaves, or coarse leaf mold.

A soil suitable for growing most seeds consists of two parts fibrous garden loam, one part sharp sand, and one part humus or leaf mould. The best loam for use in seed flats is old sod which has been piled up and rotted for about six months. This contains enough well-decayed organic matter to make it loose and friable. Ordinary field or garden soil may be used, but will not be nearly so good. The sand should be good and sharp so that it will pack reasonably well. The leaf mold or humus used should be about half decayed, a part of it still being fibrous and showing some leaf structure. Each of these three ingredients should first be sifted through a one-fourth-inch sieve and mixed thoroughly. If the mixing is done with the sifting, it will be easier than to mix separately.

Then fill each flat a little over-full of this material, tap the flat down on the floor once or twice to settle the soil, but not pack it, then run a board along the top to level the soil even with the top boards of the flat. Then use a small board as a tamper and pack the soil down until it is evenly firmed and about one half inch below the top. There should be no low spots or humps in it.

For sowing the seeds, make furrows of suitable depth one and one half inches apart. The depth will depend on the size

of the seed, the usual rule being to put the seeds in the soil two and one half times their thickness at a distance about equal to five times the thickness of the seed. The distance apart will depend upon how long the plants will remain in the flats and whether the particular kinds are especially subject to damping off. Sow seeds that are subject to damping off much more thinly than the average. If the seeds are chaffy and known to be of low germination they may, of course, be sown thickly. After sowing, all except the very finest seeds should be covered and the soil again packed down. For very fine seeds, such as Begonias, Lobelias and Petunias, sow them on the surface and cover with a light dusting of soil from a sieve of wire mosquito netting.

After sowing, water thoroughly with a very fine spray or, if dealing with exceedingly small seeds that are liable to be disturbed by watering, cover the flat with one layer of newspaper, turn in the corners so the newspaper rests directly on the soil with edges turned up, then fill the hollow thus made with water and let it soak in through the paper. After this the paper can be left on for four or five days until the seeds begin to develop. This method of watering was demonstrated by Mrs. Lockwood at our last meeting and proved most effective.

Soils and Fertilizers

Practically all soils can be benefitted by regular fertilizing. The amount and kind of material to use will depend not only on the past history of the soil, but on its texture and character. A loose loamy soil containing a small amount of sand is the easiest to handle. A stiff clay may prove more fertile, but is harder to keep in good condition and is liable to become acid and for many garden crops to need liming. Sandy soil is the easiest to work, is apt to be the least fertile, and requires the most attention in fertilizing and manuring.

While plants require, in varying amounts, a large proportion of the ninety-two chemical elements now recognized, and while we are constantly learning more about their needs for minute quantities of the rarer substances, we need now to consider only three chemical aids. These are nitrogen (N), phosphorus (P_2O_5), and potash (K_2O).

Of these three the most constantly needed is nitrogen. Next to carbon and water, which form the real basis of all living material, nitrogen is used in the greatest amount. This used to be supplied as ammonia in manures and organic wastes. Nowadays, since we depend more and more on machinery and less on livestock, manures are becoming scarce and gardeners must depend on chemicals for fertilizer. There are certain advantages, particularly in nitrogenous fertilizers, even where manure is plentiful. For instance, in early spring and during cool seasons, manure does not decay rapidly enough to supply an optimum amount of nitrogen for plant growth. Then nitrate of soda, sulphate of ammonia or some other immediately soluble nitrogen compound will give immediate and beneficial results even on soil heavily manured.

Phosphorus, the next most important fertilizer, is specially important in cell-building and so is most useful in encouraging flower and seed production. The old-fashioned source of this was bone, supplied as ground bone, steamed bonemeal, or acid-treated bone. Bone in the natural state decays very slowly and even finely ground bone takes six or seven years to become fully available, so it is both slow-acting and very safe to use. A quicker source of phosphorus is acid-treated rock phosphate from our eastern states. This is sold in the trade as superphosphate and the greater part of the phosphorus in it is soluble and immediately useful. Manure is normally very poor in phosphorus, so either bone or superphosphate should be used to supplement it at the rate of about one hundred pounds or somewhat more per ton of manure used.

The third important fertilizer, potash, is abundant in manures. It may also be supplied from sources such as wood ashes, the ash from hardwood being much superior to that from pine or other conifers. A good grade of wood ashes, not too much leached by the weather, contains from ten to fifteen percent potash. The commercial source of potash is now the salts produced by the French and German potash mines. The raw material from these is muriate (chloride) of potassium which contains about forty percent potash. The purified potash, which is sulphate of potassium, contains fifty percent potash.

The amounts of these used on the soil is approximately as follows: nitrate of soda—about one pound per hundred square

feet; superphosphate—about two pounds per hundred square feet, or bonemeal at nearly the same rate; muriate of potash—not more than one half pound per hundred square feet; one third pound would be better.

Mixed Fertilizers

The law in New York State and in most states requires that fertilizer dealers print the analysis of their fertilizers on the package as sold. This analysis is usually given as three percentages, the first number representing the amount of nitrogen in percent of the total; the second, the amount of phosphorus; and the third, the amount of potash. Thus, a good fertilizer nowadays will have approximately the formula about 5–10–5, that is, five percent nitrogen, ten percent phosphorus, and five percent potash. Since this contains only about one third as much strength of nitrogen as nitrate of soda, it can be used at the rate of three pounds per hundred square feet with advantage. A mixed fertilizer of such moderate concentration usually contains some immediately available material and some that is slow-acting, so that one or two applications per year of such material is sufficient. For gardens that are worked intensively and from which quicker results are demanded, a more concentrated and highly soluble material may be required. To meet this demand some dealers are putting out fertilizers of highly soluble material of formula 15–30–15 or thereabouts. This should be used frequently and in small amounts, since it is highly soluble and liable to "burn." A good rule is to use concentrated fertilizers in about the same way you would nitrate of soda; that is, about a pound per hundred square feet at a time, repeating the dose every month or so. For dahlias and show flowers, a still smaller application every ten days may prove successful. In my own garden I have made no effort to secure any organic manure at all and have used only decaying leaf moulds, different kinds of commercial humus, and chemical fertilizers. The results have been entirely satisfactory; and at the agricultural experiment stations, fields have been fertilized chemically for half a century with good production, with no use of manure at all.

Forman T. McLean,
Supervisor of Public Education.

A BOTANIST'S RAMBLES THROUGH THE WEST INDIES[1]

The West Indian tropics have a peculiar charm for those who have been there. It may be due to the dense vegetation, the gorgeous flowers, birds, and insects, or the blue skies and the azure Caribbean. The many people, of different race and color, and the odd customs and dress add to the interest. Combined, they cause a yearning to go again and this yearning inspired the wanderlust during the cold days of the winter of 1930.

The West Indies stretch in a long chain of over two thousand miles from east of Yucatan to within a few miles of Venezuela. The four large western islands, Cuba, Jamaica, Haiti-San Domingo, and Porto Rico are called the Greater Antilles, and the smaller ones, in a curved chain southward from Porto Rico, the Lesser Antilles. It was to the latter that our journey carried us. In these Lesser Antilles are several hundred islands, but aside from those to be mentioned, there are only four or five large and important enough for steamers to stop at, the others being very small or mere uninhabited rocks. A few of the islands are of the so-called coral formation, Barbados being the largest. The others are of volcanic origin, the tops of a high range of mountains which in past geologic time was the rim of a stagnant marsh, and which marsh by later subsidence became the Caribbean Sea. There are said to be eleven volcanoes in the Lesser Antilles, several of which have been violently active within historic time. Numerous other evidences of volcanic activity also exist. All of the islands are within the tropics, lying between about ten and eighteen degrees of north latitude.

Our first stop was made at St. Thomas in the Virgin Islands, and later ones ranging in duration from a few hours to a full day, were made at St. Croix, St. Kitts, Guadeloupe, Antigua, Dominica, St. Lucia, and Martinique. All these islands appear to be much alike when observed superficially, but the close observer will note many differences between them, in their geology, their flora and fauna, and their people. We have pleasant recollections of Dominica, a botanist's paradise, and Martinique, with its great volcano Mont Pelée.

[1] Abstract of an illustrated lecture given at The New York Botanical Garden on Saturday afternoon, November 21, 1931.

After Martinique we arrived at Barbados, where we had planned to stay a week, so that I could study the famous deposits of infusorial earth that are located there. They are in the northeastern part of the island, in a hilly section called Scotland because of its resemblance to the crags and valleys of old Scotland. The deposits are composed principally of the fossil, siliceous remains of microscopic organisms called Radiolaria, which are animals, but among them are numerous beautiful diatoms, a low group of microscopic plants in which I am particularly interested. I was fortunate in making the acquaintance of an English gentleman resident on the island, who also is a student of these organisms and from him obtained much information. Barbados is of "coral" formation. It is low, without forests or jungles, and not as interesting from a botanist's standpoint as the other islands visited.

A night's run brought us to Trinidad, the largest and probably the most interesting of the Lesser Antilles. Port of Spain, a city of 70,000 inhabitants, many of whom are coolies, is the capital and numbers among its people many cultured scientific men and women. I had the pleasure of becoming acquainted with many of them during our three weeks' stay, and this afforded opportunities for seeing much of the island. There are vast forests, jungles, and marshes in which wild animal life still abounds. The luxurious growth of tropical plants and flowers is everywhere. The oil fields and the famous pitch lake from which New York City's streets have been paved are interesting sights.

My interest here was in the Myxomycetes, a low group of living organisms, lying in the border land between the animals and the plants. Many interesting collecting trips into the cocoa plantations and the Mora forest yielded sufficient specimens to indicate their probable abundance at the proper season. Arrangements made with local collectors to continue the work have so far yielded good results.

Our stay in charming Trinidad came to a close. We returned on the same vessel that brought us down, and after ten days, stopping again at all the islands to say adieux to friends, we arrived at New York, filled with glorious memories.

ROBERT HAGELSTEIN.

A GLANCE AT CURRENT LITERATURE[1]

How observation of natural forms is stimulating to the designer's sense of beauty, and why observation of natural processes is essential to stability and success in the work of the landscape architect are told in an article by the late O. C. Simonds in the first quarterly issue of *Landscape Architecture* for 1932. But, warns the author, the designer must be careful to make the proper selection of the material and arrangements that nature offers.

* * * *

A new botanical publication, *Leaflets of Western Botany*, by Alice Eastwood and John Thomas Howell made its appearance on January 16, 1932, in San Francisco. It contains "The Pittosporums in California Garden and Parks" by Miss Eastwood and "A New California *Baeria*" by Mr. Howell.

* * * *

"Hellebores in Folk-lore and Fact" in *The Gardeners' Chronicle* for January 9, cites curious myths and early beliefs surrounding this poisonous root, more than one of which bestows upon it the power to cure insanity. Its original name was Melampode, in honor of the shepherd Melampus, who was first believed to have used it.

* * * *

Three new patents which have been granted for plants are described in the December *Journal of Heredity*. The recipients are Joseph Spanbauer, for a variety of rose produced by hybridizing; Otto A. Mueller, for an improved fragrant white carnation; and Elmer L. Pollard and Jubal E. Sherrill, for a thornless young dewberry.

* * * *

H. O. Evans writes of his experiences with thrips in *The Gladiolus Review* for February. In telling how they can best be controlled, he advises, among other steps, fumigating bulbs and spraying the plants every ten days after they are six inches high.

[1] All publications mentioned here—and many others—are available in the library of The New York Botanical Garden in the Museum Building.

Trees in and around the city of Washington, and trees associated with the life of George Washington, fill most of the pages of *American Forests* for February. Many fine photographs adorn this issue, and there is also a horticultural map of Lafayette Park in the National Capitol.

* * * *

New books reviewed by Willard N. Clute in his January number of *The American Botanist* include, besides his own "Swamp and Dune," "The Garden of the World" by Janet McGill (technical botany for younger readers); "The Modern Nursery" by Alex. Laurie and L. C. Chadwick; "Adventures in a Suburban Garden" by Louise Beebe Wilder; "Fieldwork for the Local Botanist" by A. S. Hitchcock; "Modern Herbal" by Mrs. M. Grieve (first published in England, but now brought out in the United States); and "Trees in Winter" by A. F. Blakeslee and C. D. Jarvis.

* * * *

How mosses can be used effectively in landscape gardening is revealed in the September issue of *The Bryologist*. Give them abundant moisture, keep them clear of dead leaves and other coverings, and select suitable species for each location, advises A. J. Grout, the author.

* * * *

Romaine B. Ware writes of garden pools in *Nature Magazine* for March, illustrating in words and pictures how to install pools, what to plant in and around them, and how to care for such a garden. *Horticulture* for February 1 also has an article on "The Place of Pools in the Garden Picture."

* * * *

There is an excellent gardening guide in *House and Garden* for March, prepared by F. F. Rockwell. It gives, in tabulated form, suggestions for planting vines, trees (both evergreen and deciduous), shrubs, perennials, and annuals in the Northeast, Northwest, and Middle West, giving the color, size, character, uses, requirements, and season of each plant.

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Many cypress stumps, all upright, and one of them seventeen feet in circumference, have been found in a recent excavation in

downtown Philadelphia, *Bartonia* tells in its issue of February 13. The excavation uncovered 2800 cubic feet of swamp sod 38 feet below the street and ten feet below sea-level. It is believed the trees grew there prior to the last glaciation of the region.

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The small garden becomes a fairyland when trees with showy flowers are used. C. F. Greeves-Carpenter tells which ones to plant in the *Gardeners' Chronicle of America* for February.

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Cacti and other succulents used in interior decoration are featured in the *Cactus and Succulent Journal* for January. Among the wall decorations and table ornaments shown is an exquisite *Echeveria* moulded in enameled copper.

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American Forests for January contains some magnificent photographic studies entitled "The Garden in Winter"; also a tempting sketch of Dominica as a botanical paradise by Paul Griswold Howes.

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Snapdragons for the garden and how to care for them, and "hollow-wall" gardening, in which a brick enclosure is filled with flowers and hanging vines, are two of the interesting gardening features in *Nature Magazine* for February.

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The American Home for February offers among other articles, "Embowered Beauty in Vines," "Flowering Plants for the Shaded Nook," and "Modern Fashions in Old-time Flowers."

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How grass has formed the foundation for civilization and wealth throughout all ages the world over is the fascinating story unfolded in the book called "Grass," written by A. S. Hitchcock and Agnes Chase of the United States Department of Agriculture and recently published by the Smithsonian Institution.

"Man's first attempt to control his fate, to provide for future need instead of remaining the victim of droughts or other untoward circumstances, must have been on grasslands where the young calves, lambs, and kids he caught and tamed could find forage," the authors say. "It was on grasslands, too, that primi-

tive man, after he had reached the food-producing as distinguished from the food-gathering stage, developed most rapidly." And thus is the history of man traced from country to country, and from lower to ever higher levels of civilization, always with grass—that is, with feed for animals and grains as food for man himself, as the basis of his changing life.

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A new illustrated manual of the flora of Quebec, written by Père Louis-Marie under the title of "Flore-Manuel" has just been issued in French. It is designated as Contribution 23 from the Institut Agricole d'Oka.

* * * *

The Proceedings of the Americal Society for Horticultural Science for 1930, recently published, contains a host of material of value to flower, fruit, and vegetable-growers. There are nearly 600 pages of text, with abundant illustrations and an index, containing about 150 authoritative articles on horticulture done in readable language.

* * * *

Chrysanthemums are a feature of *The Gardeners' Chronicle* for January 16. One especially noteworthy plant illustrated is a small-flowered Sho-Rin from Hibiya Park in Tokyo, where it is grown in the Ken-gai style—that is, "hanging over a precipice."

There is another photograph of this "cascade" chrysanthemum, as it is generally known, in the *Gardeners' Chronicle of America* for February, and still another in the Bulletin of the Missouri Botanical Garden for January.

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Those interested in the discussions of the International Botanical Congress in Cambridge, England, in 1930, will find a complete report of them in the volume of Proceedings which has just been issued.

* * * *

The centenary of Robert Brown's discovery of the nucleus of plant cells is described, with excerpts from his notes, in *The Journal of Botany* for January. A centenary exhibit was shown in the British Museum, where the discoverer was once Keeper of Botany.

Horticulture for February 1 mentions a new double sweet-scented nasturtium known as "Golden Gleam."

* * * *

"Pitch Pine in Pennsylvania" is the title of Research Bulletin 2 of the State Department of Forests and Waters in Pennsylvania. The authors, Joseph S. Illick and John E. Aughanbaugh, point to *Pinus rigida* as an important tree of many uses, the most widely spread tree in the state and the most fire-resistant evergreen.

* * * *

So entrancing are the pictures in *The National Horticultural Magazine* for January that one hesitates to recommend one article more than another. Among the offerings are a series of photographs from Berlin, some special material on saxifrage, and many pictures from exquisite rock gardens in bloom.

CAROL H WOODWARD.

NOTES, NEWS, AND COMMENT

Dr. J. H. Faull, Professor of Forest Pathology in Harvard University, spent a day in the Garden recently, looking over specimens of plant rusts in connection with the monograph of the genus *Milesia* occurring on ferns and firs.

The Economic Museum is in receipt (October 7) of a specimen of *Asimina triloba,* or paw-paw, consisting of four fruits and a leaf-bearing twig, and representing a variety that is generally recognized in the Ohio Valley under the name "White Paw-paw." The donor is Mr. William H. Rudder, a valued correspondent, a pharmacist of Salem, Indiana, and a keenly observant local botanist. Mr. Rudder submits the following remarks concerning this variety:

"They are not looked on with favor by the lovers of the yellow paw-paw, which grows larger and longer, with a deep cream to golden yellow meat, and also ripens earlier. The only other difference I have observed is in the size of the bushes. I have never found the two growing together. The white bushes are five to fifteen feet high and the yellow eight to thirty feet or more."

The variability of this species is well-known, but most of its variations are inconstant and accidental, whereas the one here considered is so constant and well-characterized as to be generally recognized among country people and to have a definite name. As stated by Mr. Rudder, the fruit characters as to size, form, and color of pulp are accompanied by a smaller habit of growth and it would appear that it should be recognized as a definite variety in botanical literature. [H. H. RUSBY]

Meteorology for February: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 56° F on the 7th; *60° on the 8th*; 48° on the 17th; and 58° on the 26th. The minimum temperatures recorded were: 19° F. on the 1st; 21° on the 15th; *14° on the 21st*; and 16° on the 24th and the 25th. The total precipitation for the month was 2.45 inches. This includes a half inch of snow figured as .05 inches of rainfall, which fell on the 17th of the month. Traces of snow fell on the 4th, the 24th, and the 29th of the month.

Meteorology for March. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 59° F. on the 5th; 46° on the 12th; 54° on the 19th; *63° on the 26th*; and 57° on the 31st. The minimum temperatures recorded were: 29° on the 5th; *13° on the 10th*; 14° on the 15th; 24° on the 21st; and 31° on the 29th. The total precipitation for the month was 4.43 inches. Traces of snow fell on the 7th, the 14th, and the 21st.

PUBLICATIONS OF

THE NEW YORK BOTANICAL GARDEN

Journal of The New York Botanical Garden, monthly, containing notes, news, and non-technical articles. Free to members of the Garden. To others, 10 cents a copy; $1.00 a year. Now in its thirty-third volume.

Mycologia, bimonthly, devoted to fungi, including lichens; $5.00 a year; single copies not for sale. [Not offered in exchange.] Now in its twenty-fourth volume.

Addisonia, quarterly, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Subscription price, $10.00 a year. [Not offered in exchange.] Now in its seventeenth volume.

Bulletin of The New York Botanical Garden, containing reports of the Director-in-Chief and other official documents, and technical articles embodying results of investigations. Free to all members of the Garden; to others, $3.00 per volume. Now in its fourteenth volume.

North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. Planned to be completed in 34 volumes. Roy. 8vo. Each volume to consist of four or more parts. 71 parts now issued. Subscription price, $1.50 per part; a limited number of separate parts will be sold for $2.00 each. [Not offered in exchange.]

Memoirs of The New York Botanical Garden. Price to members of the Garden, vols. I–VI, $1.50 per volume; to others, $3.00. Vol. VII, $2.50 to members; to others, $5.00.

Vol. I. An Annotated Catalogue of the Flora of Montana and the Yellowstone Park, by Per Axel Rydberg. ix + 492 pp., with detailed map. 1900.

Vol. II. The Influence of Light and Darkness upon Growth and Development, by D. T. MacDougal. xvi + 320 pp., with 176 figures. 1903.

Vol. III. Studies of Cretaceous Coniferous Remains from Kreischerville, New York, by A. Hollick and E. C. Jeffrey. xiii + 138 pp., with 29 plates. 1909.

Vol. IV. Effects of the Rays of Radium on Plants, by Charles Stuart Gager. viii + 478 pp., with 73 figures and 14 plates. 1908.

Vol. V. Flora of the Vicinity of New York: A Contribution to Plant Geography, by Norman Taylor. vi + 683 pp., with 9 plates. 1915.

Vol. VI. Papers presented at the Celebration of the Twentieth Anniversary of The New York Botanical Garden. viii + 594 pp., with 43 plates and many text figures. 1916.

Vol. VII. Includes New Myxophyceae from Porto Rico, by N. L. Gardner; The Flower Behavior of Avocados, by A. B. Stout; Descriptions of New Genera and Species of Plants Collected on the Mulford Biological Exploration of the Amazon Valley, 1921–1922, by H. H. Rusby; and The Flora of the Saint Eugene Silts, Kootenay Valley, British Columbia, by Arthur Hollick. viii + 464 pp., with 47 plates, 10 charts, and 11 text-figures. 1927.

Brittonia. A series of botanical papers. Subscription price, $5.00 per volume. Now in its first volume.

Contributions from The New York Botanical Garden. A series of technical papers written by students or members of the staff, and reprinted from journals other than the above. Price, 25 cents each. $5.00 per volume. In the fourteenth volume.

THE NEW YORK BOTANICAL GARDEN
Bronx Park, New York, N. Y.

GENERAL INFORMATION

Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 41,700 books and numerous pamphlets.

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JOURNAL
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NOTES, NEWS, AND COMMENT

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THE SO-CALLED CHINESE EVERGREEN—AGLAONEMA MODESTUM

China has yielded a number of species of plants that are peculiarly well adapted to growth under urban conditions in the eastern United States, among the trees being the well-known ubiquitous tree of heaven, *Ailanthus Cacodendron* (Ehrh.) Schinz & Thellung, more commonly known as *A. glandulosa* Desf.; and the maiden-hair tree, *Ginkgo biloba* Linn., although the latter is not now known in a wild state in China. The list, however, is not confined to trees adapted to growth out-of-doors under modern city conditions, for China has also contributed some particularly hardy indoor plants, and by "hardy" is meant those plants that will thrive with little attention under the peculiarly unfavorable conditions that exist in the average city dwelling or apartment, as well illustrated by the common *Aspidistra*.

The subject of this paper is a species, although now very common in cultivation, that has been sadly misunderstood by both botanists and horticulturists, and apparently is one that rarely or never occurs in the trade, at least in the United States, under its correct scientific name. It is a representative of the genus *Aglaonema*, a group that contains 41 recognized species, chiefly natives of the Malaysian region, with one occurring as far to the northwest as the Khasia Mountains in India, a few in Burma, Siam, and Indo-China, and one in Kwangtung Province, southeastern China. The plants grow in nature in damp, shaded ravines, sometimes in very wet soil, sometimes among boulders on steep forested slopes.

My attention was first directed to this species in 1918 when I attempted to determine the status of *Aglaonema modestum* Schott,

which was based on material said to have been collected by Gaudichaud in the Philippines in 1836 or 1837. After a rather critical study of the literature and material available to me, it became evident that this species was not a native of the Philippine Islands and I then concluded that Gaudichaud had probably secured his material at Macao near Hong Kong, where he also botanized, the indicated habitat, Luzon, being an error on his part. I now suspect that it is highly probable that he actually did secure his material in Manila but that the specimens were taken from plants imported from southeastern China by the Chinese and grown for ornamental purposes in Manila; it seems probable that the species has been cultivated for a long period by the Chinese, and that it was more or less disseminated by them in the Orient, quite as in more recent times it has been disseminated by them in the United States.

In studying the problem in 1918, it was found that material recently collected in Kwangtung Province agreed absolutely with the published descriptions and illustrations of *Aglaonema modestum* Schott and with the description of *A. acutispathum* N. E. Brown, and the conclusions then drawn were to the effect that the two binomials pertained to a single species, as Engler had already concluded; that the species did not occur in the Philippines, at least as a native; that, as far as then known, it was confined to Kwangtung Province, except as a cultivated plant elsewhere. No additional data have been received that modify this conclusion.

My attention was again called to the matter in 1931, when it was observed that the species in question was commonly cultivated in residences and apartments in New York City, partly for its decorative effect, partly because of the fact that it withstands remarkably well the rather difficult environmental conditions characteristic of city homes, and partly because of the fact that the plant can be grown for long periods as a "cut plant" with its stems immersed in water, soil not being an essential to maintaining it over long periods of time in a thrifty condition. Still more recently, certain notices pertaining to the species appearing in *Horticulture* intrigued me; I have therefore re-examined the entire problem.

Early in 1931 there appeared in *Horticulture*[1] a short, illus-

[1] **9**: 37. *1 fig.* 1931.

FIGURE 1. *Aglaonema modestum,* a popular plant for indoor cultivation.

trated, anonymous article entitled "The Chinese Evergreen," where the plant under discussion was erroneously identified as *Dieffenbachia Sequine.* The author briefly stated that the so-called Chinese Evergreen is an aroid, useful in making the now popular miniature Japanese gardens, calling attention to the fact that it grows as well in water as the English ivy; that direct sunlight is not necessary—in fact, a darker place is equally good, which is readily understood when it is realized that the plant usually grows in nature in shady places; and that a piece of charcoal should be added to the water to keep it sweet. In a later number of the same periodical, under "Rambling Observations of a Roving Gardener,"[2] exception is taken to the statements of the anonymous author referred to above. The binomial is corrected to *Dieffenbachia Seguine* but the "roving gardener" did not realize that the individual he was criticizing and that he himself were both wrong in referring the plant to the tropical American genus *Dieffenbachia*; hence, that part of the criticism quoted below is

[2] *Op. cit.,* 98.

beside the point: "Just why anyone should conceive the name 'Chinese Evergreen' is past all understanding. *D. Seguine* and all other members of the genus hail from South America, so there is nothing Chinese about it"—nothing Chinese except that it did originate in Kwangtung Province, China, and *not* in South America; that the Chinese themselves have long cultivated the plant for ornamental purposes, and that they, at least to a certain degree, have been instrumental in its dissemination as a cultivated ornamental plant. The common name "Chinese Evergreen" is probably too firmly fixed in the trade to change; it is not a particularly descriptive one but the plant is "evergreen" and does come from China, and as a common name it may as well stand; it is sometimes known as "Chinese water-plant" and as the "common Aglaonema." A little later, Mr. T. H. Everett[3] called attention to the fact that the so-called Chinese Evergreen as sold by florists and as illustrated in *Horticulture* is most certainly *not* a *Dieffenbachia* but is rather a species of *Aglaonema,* and he thought that it probably represented *A. simplex* Blume, which is a species allied to *A. modestum* Schott, and which is recorded from Indo-China, Java, Borneo, the southern Philippines and Celebes; it was originally described from Javan material. Blume's species does not appear to be in cultivation in the United States.

The Gaudichaud plant on which the original description was based has not been located in the Paris herbarium. As indicated above, it was supposed to have been collected in Luzon, but in publishing Schott's description Engler notes that its place of origin was unknown. N. E. Brown, in describing *Aglaonema acutispathum*, which he considered to be distinct from *A. modestum*, notes that the original material on which his description was based, as grown at Kew, was presented by Dr. Knaggs, who purchased the plant in Hong Kong, thinking that it probably came from the vicinity of Canton. Brown later states that there was another specimen in the Kew Herbarium, labeled as having been brought by Dr. Knaggs from Shanghai, also that the species was cultivated in southern China, the basis of this statement being a specimen collected by Dr. Hance. I now have two excellent specimens of the species from Kwangtung Province: *C. O. Levine 1167* from near Canton, and *H. Y. Chun 6426* from Teng Wu

[3] *Op. cit.*, 154.

Shan, a short distance up the West River, above Canton. In neither case, however, did the collector indicate whether the specimens were taken from wild or cultivated plants.

As common as the plant now is in cultivation in the eastern United States, no description of it is included in Bailey's "Standard Cyclopedia of Horticulture," nor in his "Manual of Cultivated Plants." It appears in "Hortus" under the erroneous name *Aglaonema simplex* Blume. It seems to be unnecessary to repeat a description for such a well-known plant, which is well illustrated by the accompanying photograph taken from a flowering specimen in the collections of The New York Botanical Garden. The synonymy is as follows:

AGLAONEMA MODESTUM Schott ex Engl. in DC. Monog. Phan. 2: 442. 1879; Engl. Pflanzenreich IV. 23 Dc (64): 29, *fig.* 13. 1915; Arac. Exsic. no. 74, 258.

Aglaonema acutispathum N. E. Br. in Gard. Chron. n. ser. 24: 39. 1885.

Aglaonema simplex L. H. Bailey, Hortus 31. 1930, not of Blume.

E. D. MERRILL.

BLACK STEM-ROTS AND LEAF SPOT OF PELARGONIUM

THE BACTERIAL LEAF SPOT

The bacterial leaf-spot of *Pelargonium* (geranium), familiar to most commercial growers this time of year, has been present among the varieties being studied in breeding experiments carried on in the propagating houses at The New York Botanical Garden for several years. It comes and goes, depending on the general care given the plants and on how often it happens to come in with new plants. Much loss of foliage sometimes results, but in the milder forms the leaves are merely scarred with unsightly brown spots (FIGURE 1, A, B). This disease was fully described about ten years ago by Nellie Brown,[1] although a bacterial leaf-blight of geranium had been reported several times previously. She gave

[1] Brown, N. Bacterial leaf-spot of geranium in the eastern United States. Jour. Agr. Res. **23**: 361–372. *Pl. 1–3.* 1923.

the name *Bacterium Pelargonii* to the organism causing the disease.

It is a bacterium that can live over in the soil of a propagating bed, so that one should use care in watering the plants in order to avoid splashing bits of infected soil onto healthy leaves. Leaf-spot is most serious where plants are forced in greenhouses which have poor air circulation and which are kept too warm and moist. Therefore, the plants should be well separated, giving them more space for air. The spotted leaves should be picked off to get rid of the source of infection; one should at least avoid spraying water about promiscuously where infected plants are near healthy ones.

Black stem–rot

The occasion for this note was the sudden appearance of a black stem-rot on many of the new hybrid varieties of the zonal Pelargoniums being studied at the Garden. Mature plants apparently in good condition would begin to show a water-soaked spot often associated with a lesion, suggesting a previous wound of some sort, anywhere along the stem, often near the top. This would soon develop into a soft rot accompanied by a darkening and shrinking of the stem tissue. The leaves in the region would drop off first, then the young leaves above would cease growing and gradually die off (Figure 2, A, C). The rot progresses rather slowly up and down the stem from the point of infection until the plant dies.

Two kinds of black stem-rots of geranium cuttings have been reported several times, although such troubles do not seem to have been extensive in the United States. These rots, however, begin on the lower ends of cuttings, below the surface of the soil, so that the disease is primarily a foot-rot rather than a stem-rot such as we have found in the cases noted here. The foot-rot prevents the development of a good root system, and progresses upward as a black soft rot of the stem. The tops of the cuttings may live some time without showing much new growth. Infected cuttings seldom recover to develop healthy plants. With the complete destruction of the lower end, the plant topples over and dies.

The first type of *Pelargonium* cutting rot is caused by bacteria. It was described as early as 1888 by Lequet[2] in France as due to

[2] Lequet, F. La maladie des *Pelargonium zonale* et *inquinans* hybrides. Rev. Hort. **60**: 166–168. 1888.

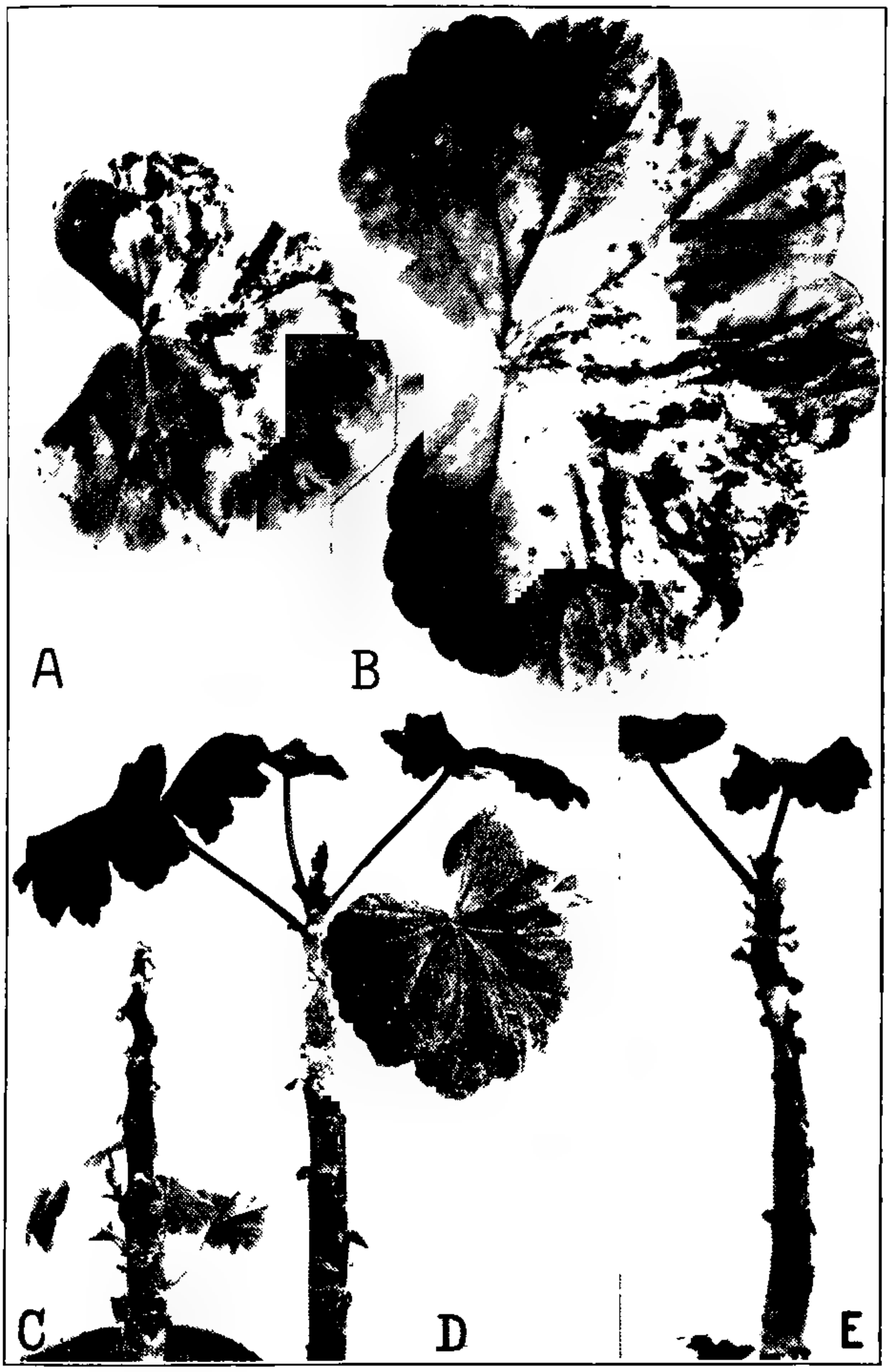

FIGURE 1. Leaf-spot and stem-rot of *Pelargonium*.

"microbes." The knowledge that bacteria could cause plant disease was at that time not wide-spread, and cultures of the organism, of course, were not made. The symptoms recorded, however, appear to be typical of the bacterial *Pelargonium* rot. Prillieux and Delacroix[3] gave the organism the name *Bacillus caulivorus,* and in 1891 reported it in connection with stem "gangrene" of *Pelargonium* and potato.

Galloway[4] was unable to find anything but bacteria associated with cutting rots of geranium in the United States which he described some years ago. Inoculations from pure cultures of the organism were not made, but inoculations directly from infected stems reproduced the disease. A wilt of geranium is mentioned in the *Plant Disease Reporter,* Supplement 37, 1925, where it was said that the trouble was common in Florida, though not severe, but that it caused death in some instances. A letter from Nellie Brown, of the United States Department of Agriculture, in reply to a request for information on bacterial diseases of *Pelargonium,* states that she has had a strain of the geranium bacterium "which was very infectious and produced dark lesions on the stems." She was of the opinion, however, that our plants were probably affected with the second type of black rot caused by *Pythium.* Our inoculation experiments, however, have proved that this is not the case.

The second type of black stem-rot of *Pelargonium* cuttings is similar in its manifestations to the bacterial rot, but is due to a fungus. Harry Braun[5] described it as being caused by four different species of the soil fungus *Pythium.* One of these, *P de Baryanum,* has long been known to be a cause of serious cases of damping off of seedlings in seed beds. In addition to attacking geranium cuttings, it is known to infect in a similar way cuttings of *Coleus* and *Begonia.*

A thorough examination of our infected plants resulted in the finding of only one case of the black rot due to a species of

[3] Compt. Rend. Acad. Sci. (Paris) 111: 208. 1891.

[4] Galloway, B. T. Disease of Geraniums. Journ. Myc. 6: 114–115. 1891.

[5] Braun, Harry. Geranium stem-rot caused by *Pythium complectens* n. sp. Jour. Agr. Res. 29: 399–419. 1924.

Braun, Harry. Comparative studies of *Pythium de Baryanum* and two related species from Geranium. Jour. Agr. Res. 30: 1043–1062. 1925.

FIGURE 2. Black stem-rots of *Pelargonium*.

Pythium. This was the instance of a plant completely dead when investigated and consisting merely in the brown soft rotted stub of a seedling of variety no. 241. A species of *Pythium* was isolated and identified as *P. splendens*. This identification was confirmed by Dr. Charles Drechsler, of the United States Department of Agriculture. In all other cases in our greenhouses, bacteria alone were found responsible.

FIGURE 2, A and C, shows two types of the stem-rot caused by the bacterium. At B is shown for comparison a black rot of the stem resulting from an inoculation with the fungus *Pythium splendens*. As a rule the rot caused by the *Pythium* is darker in color, in most cases nearly black, whereas the bacterial rot produces a more brownish discoloration and presents a shriveled collapsed appearance more promptly than does the *Pythium* infection.

Of thirty one inoculations made with pure cultures of the stem bacterium in the greenhouse and in the laboratory, twenty eight gave positive results. In three instances the controls also became infected, possibly due to spreading of bacteria by watering or by mealy bugs or snails which were present in the greenhouse. When the experiments were carried out in an isolated laboratory, no infection of the controls occurred. FIGURE 1 shows an inoculated plant, C, and the control plant, D, after twenty-one days. They were of the same variety and were comparable in appearance before the experiment. Plant C was inoculated by wounding in three places, top, mid, and bottom, with a needle carrying bacteria. Plant D was also wounded in corresponding places with a sterile needle. The bacterium was re-isolated from plant C at the time the photograph was taken. When the wound was made in the woody tissue at the lower part of the stem, infection did not always occur, or the rot progressed more slowly than when the more succulent green tissues of the mid and upper portions were inoculated. The first signs of infection appeared as a rather inconspicuous water-soaked spot, from ten to fifteen days after inoculation. This area darkened after a time and became wrinkled and constricted (FIGURE 1, C). The rot progressed in both directions but more quickly downward. Sections of the stem showed the rot spreading in an ever narrowing sector chiefly just between the bark and the pith. Bacteria were isolated from tissue as far

as three centimeters below the point where the outward signs of the disease ceased, indicating that in controlling the trouble it is necessary to cut back a considerable distance from the visibly rotted area.

FIGURE 1, E, shows a plant twenty-three days after an inoculation, not with the stem bacterium, but with the organism isolated from typical bacterial leaf-spots such as illustrated in FIGURE 1, A and B. Of seven such inoculations, four gave positive results and the organism was re-isolated. Whether or not the organism causing stem-rot is identical with the one causing the leaf-spot is a question which must be left for further culture work and experimentation.

CONTROL OF BLACK STEM-ROTS

General control measures, such as careful watering, mentioned for the bacterial leaf-spot, should be effective also in the case of the stem-rot. Seriously affected plants should be promptly destroyed to remove sources of new infection, and the pots in which they were grown should be thoroughly sterilized. In cases of early infections, cutting back as far as possible from the infected area and treatment of the cut surfaces and of the soil with a fungicide such as Semesan should save the plants. Cuttings should not be made with an unsterilized knife which has been used in the vicinity of infected plants, and unnecessary wounding and rough handling should be avoided. The remedy suggested for control of the leaf-spot which involves the picking off of infected leaves only increases the probability of infection by the stem bacterium, if the leaf stalk is broken off close to the stem, leaving a fresh scar.

In case one is having trouble with black rots that attack the lower ends of cuttings (foot-rots) the soil is probably infected with one of the *Pythium* damping off fungi, or with the virulent strains of the stem-rot or leaf-spot bacterium. The soil should be replaced or sterilized.

B. O. DODGE,
MARJORIE E. SWIFT.

THE SOUDAN DAYLILY

The Soudan Daylily somewhat resembles the old popular Lemon Daylily (*Hemerocallis flava*), but it blooms in New York in July after the former is entirely through flowering. In comparison with the Lemon Daylily the plant is somewhat larger, the scapes are taller, and the flowers have broader petals and this makes a fuller flower, but in general color and size the flowers are

FIGURE 1. Flowers of the Soudan Daylily.

nearly the same. Hence those who are fond of the Lemon Daylily will find the Soudan Daylily of interest and value in continuing this class of plant and flower into the midsummer season.

The foliage of the Soudan Daylily is medium coarse, medium dark-green, and ascending to a general level of about two feet. The scapes are about three feet tall, branching, nearly erect, and holding the flowers well above the leaves. The flowers are clear empire-yellow in color and gold-glistening; the petals have some-

what wavy margins, and they are wide and overlapping, making an unusually full flower with a spread of about four and one half inches. The plant is day-blooming, very floriferous, and an excellent summer-flowering sort.

In obtaining the seedling that is being propagated under the name Soudan Daylily, the *Hemerocallis flava* (Lemon Daylily) was hybridized with *H. aurantiaca* and a selection in this progeny was then crossed with the Luteola Daylily, which is itself supposed to be a hybrid between *H. Thunbergii* and either *H. aurantiaca* or *H. aurantiaca major*. The progeny of this diverse parentage had flowers of various shades of yellow and orange coloring, with, in a few cases, tinges of fulvous. Two of this particular series of hybrids have already been named the Vesta Daylily and the Wau-Bun Daylily.

The Soudan Daylily is the sixth of the various new hybrid seedlings developed at The New York Botanical Garden that have now been described and illustrated in the pages of this JOURNAL. Those already so described are Cinnabar, Mikado, Vesta, Wau-Bun (issue of Feb., 1931) and Bijou (issue of Jan., 1932). Several other seedlings of special merit are being propagated for possible distribution later.

A. B. STOUT.

COLLECTING INSECTS IN HERBARIA[1]

At first thought an herbarium might seem to be a poor place to collect insects; still, many insects find dried plants suitable for food -so much so that all modern herbarium specimens are treated with corrosive sublimate to prevent their destruction by insects or by moulds.

There are also several groups of insects which, feeding as grubs or caterpillars in the fruits at the time the plants are picked, may often be found in herbarium specimens. Among

[1] J. C. Bridwell, a private student of the seed weevils of the family Bruchidae, working with his headquarters in the National Museum at Washington, spent three weeks during October and November examining the legumes of the newly arranged Asiatic and Indo-Malayan Herbarium and collecting Bruchidae from the pods and seeds contained therein. [Ed.]

these are moths of several families, whose caterpillars feed on seeds and fruits and are imprisoned when herbarium specimens are made. These are, however, usually unable to complete their transformations and are only exceptionally of use to students of the Lepidoptera. Many snout beetles live in the same manner but most of them must transform from grub to beetle in the earth, hence we can usually learn but little about them from herbarium material.

Some Cynipid gall wasps make galls in the substance of seeds (particularly acorns), and several groups of Chalcidoidea (usually parasitic upon other insects) produce galls in seeds or feed directly on the substance of seeds. These Hymenoptera complete their transformations within the pods or seeds, and useful material of them can sometimes be obtained by the examination of herbaria. The snout beetles of the genus *Apion* include many species living in fruits or seeds.

The group most frequently found in herbaria are the seed weevils of the family Bruchidae, most often found in the pods or seeds of legumes. These beetles are, like the legumes, most abundant in tropical and subtropical regions, but some species reach northward into Scandinavia, Kamchatka, and Alaska.

The Bruchidae have worked out interesting methods of entering the immature seed as larvae and leaving it as adults after it has ripened. The eggs are usually cemented firmly to the pods about the time they have reached full growth but are still green. The eggshell serves as a point of support for the young larva in eating its way into the pod, bracing itself between the eggshell and pod by means of a transverse pectinate ridge on the first body segment, characteristic of the first larval stage of the Bruchids.

Once within the seed, the larva eats a surprisingly small portion of food for its size. Before pupating, it prepares the way for its own escape as an adult beetle by making a circular window, closed only by the cuticle of the pod or seed. It then compacts the débris resulting from its feeding by a cement, and the whole hardens into a coarsely fibrous silk-like cocoon. After it has transformed and is ready to emerge, the adult extends its head and with its sharp-pointed jaws traces a perfect circle around the membranous window separating it from the outside world,

and, propelled by its thickened hind legs, pushes out a perfectly circular disc of the seed-coat or pod and forces its way out through the circular opening—unless something interferes. At best, this opening is a very close fit for the shoulders of the beetle and if it is only a trifle too small the beetle is doomed. Even under natural conditions many fail to emerge, and the conditions of the plant-press and herbarium prevent the escape of a large proportion of those in herbaria. But even if all the Bruchids have escaped, their former presence can be ascertained, for the work of the Bruchidae in pods and seeds is nowhere else exactly duplicated.

My three weeks' visit to the Herbarium of The New York Botanical Garden has been fruitful in extending our knowledge of the Bruchidae from regions where they are but little known. The particular conditions making it seem worth while to spend so much time in examining this herbarium were the coincidence of my visiting the herbarium when myself engaged in assembling our knowledge of the Bruchidae of eastern Asia and finding the great Asiatic and Indo-Malayan Herbarium newly assembled by Dr. Merrill, in which I was hospitably permitted to collect Bruchidae while studying the Asiatic plants supporting or likely to be found supporting Bruchidae.

It may be suggestive to mention a few of the specific results of my visit. In 1855 Jekel described from the "East Indies" a peculiar genus and species of Bruchidae under the name of *Caryopemon hieroglyphicus*. Several other imperfectly described species have been added to this genus, among them one described as *Caryoborus cruciatus* by Stephens, which was obtained in England from "red West India" seeds. It was not until 1922 that I was able to record that this species actually breeds in southeastern Africa in the seeds of the "praying bean" (*Abrus precatorius*). This remains the only record of the host plant of any *Caryopemon*. I had been unable to find the host plant of Jekel's species which I found in numbers in Goa (Portuguese India) in 1925, and two species of the genus described from Indo-China and Yunnan could not be certainly distinguished from each other and from Jekel's species, and no material of either was at hand for study. It can be easily imagined that I was pleased to find

the head of a *Caryopemon* showing in the seed of *Mucuna Collettii* Lace, collected in Yunnan. Presumably this is *Caryopemon giganteus* Pic, the largest described Bruchid from the Old World.

Fischer von Waldheim described a peculiar beetle found in seeds of *Robinia* [*Caragana*] *jubata* brought back by Karasin from his explorations in central Asia, and announced this important new method of securing insects from distant regions. But it was not until 1925 that Fischer's *Kytorhinus Karasini* was recovered, found in seeds of another *Caragana* brought back by Kingdon Ward from Szechuan. The genus had been lost sight of from 1809 until Motschulsky's posthumous paper of 1874 described other species from central Asia. Among these was a species taken in the seeds of *Thermopsis lanceolata* in Songaria. Hitherto no authentic material of this species has been present in this country and it has been impossible to be certain of its identity. Whether it might be distinct from some other species could not be determined, for it was described in terms too indefinite for precise identification.

In the collection of the United States National Museum is a *Kytorhinus* found in seeds of *Piptanthus nepalensis* from Darjeeling. It did not occur to me that this species might be identical with Motschulsky's, but after seeing the pods of *Piptanthus nepalensis* and *Thermopsis lanceolata* in the herbarium of The New York Botanical Garden, it could be seen at once that the same insect might well employ both for food. Finding a *Kytorhinus* in seeds of *Thermopsis lanceolata* collected by R. W. Chaney in outer Mongolia while with the third Asiatic expedition of the American Museum of Natural History will make it possible to solve some of these problems.

Many years ago William A. Ashmead described a Chalcidoid wasp from the seeds of clover and gave the species the name *Bruchophagus funebris* under the impression that it was a parasite of some *Bruchus* in the clover seed. In time it was discovered that it was itself an enemy of red clover and alfalfa and it has become one of the most serious pests of alfalfa and red clover seed producers. Soon after it was found to be *phytophagous*, Professor Cockerell reported it as breeding in the seeds of a species of *Hosackia* (*Lotus* or *Anisolotus*), but this record has

been lost sight of by the economic entomologists, and it has been treated as affecting only the plants of the clover tribe. I have incidentally found it affecting *Oxytropis* and *Astragalus*, and now in The New York Botanical Garden Herbarium I have found this, or something very nearly akin to it, in the seeds of a *Gueldenstaedtia* and also a *Lespedeza*. When this material has been submitted to critical study by a specialist in that group, light will be thrown on the habits and native country of this economic insect or of its close kin.

J. C. BRIDWELL.

FOUR RECENT BOOKS REVIEWED

A NEW GUIDE TO PERENNIALS[1]

This little handbook by Alfred C. Hottes is based on his third edition of "A little book of perennials." The new book is considerably enlarged and has a number of additions of things recently introduced into the garden. Like all of the garden books from this prolific author, this latest one on perennials is a thoroughly practical and serviceable guide, based not only on his wide experience, but also on the thorough study of the writings and experiences of others.

It is more of a reference book than a narrative, since four fifths of it is devoted to the discussion of individual kinds of plants and only the first forty pages are given over to general and very brief notes on gardening operations, but it is a discussion of each individual genus or species. It takes up the adaptability of each, its culture and propagation, and special needs. For instance, in his comment on the daylilies he discusses the recent hybrids produced by Dr. Stout, Mr. Betscher, and Mr. Mead, as well as telling where to plant them and how to grow them.

Turning to a more difficult subject, his comment on *Meconopsis*, the blue poppy, is based principally on quotations from the successful experiences of the few growers who have succeeded with them, and he is quite candid in stating the difficulties with them. In dealing with the Virginia bluebells, the

[1] Hottes, Alfred C. The book of perennials. Pp. 1–272. A. T. De La Mare Company, Inc., New York, 1931. [*illust.*]

Mertensias, which have aroused so much interest recently, he tells quite frankly of their limitations and faults, notably that their foliage dies down early, leaving bare patches in the garden.

Similar practical comment on the many other popular hardy perennials makes the book a thoroughly worth-while addition to any gardening library. While not elaborate, either in its make-up or illustrations, the majority of gardeners will find it a more useful guide than many of the more ornamental books.

Haunts and Habits of the Cactus[1]

Dr. Forrest Shreve has spent several years of study in the Arizona desert and he tells us most appropriately about the cactus and its native home. He writes of it as an observant botanist and close student of nature. He tells us more about the habits of the cacti than has ever appeared in any previous publication, devoting 143 pages of the total of 195 to the cactus and its native haunts. The forty pages given over to cultivation contain sound and clear instructions, principally for their cultivation outdoors in a suitable climate.

The book, as a whole, is readable, interesting, and full of information, one that will satisfy the enthusiast and awaken interest in further study of this group among those who know the cacti only as dwellers in little dish gardens of apartment houses. Dr. Shreve is evidently a devoted admirer of the queer denizens of the desert and he successfully arouses the enthusiasm of the reader.

Cacti as a "Fantastic Clan"[1]

Professor John James Thornber and Frances Bonker in this, their third book on desert botany, give an interesting narrative of the cacti of California and Arizona. While this is the fourth cactus book to appear within a year, being preceded by *Our Native Cacti* by Ethel Bailey Higgins, *The Cactus Book* by A. D.

[1] Shreve, Forrest. The cactus and its home. Pp. i xii + 1–195. f. 1–43. The Williams & Wilkins Company, Baltimore, Md., 1931. $3.00.

[1] Thornber, John James, and Bonker, Frances. The fantastic clan. Pp. i–xiv + 1–194. The Macmillan Company, New York, February, 1932. [*illust.*] $3.50.

Houghton and *The Cactus and Its Home* by Forrest Shreve, this one will find a place for itself a little apart from all of the others.

Written as a narrative of a trip through the desert, *The Fantastic Clan* describes the different cacti as they appear in their native haunts, with interesting comment on the native lore concerning them, their local names, and peculiarities. Comments on how to grow this fantastic clan of cacti are sprinkled all through the book. Any one who knows the attractive desert garden of the University of Arizona maintained by Professor Thornber readily appreciates how thoroughly sound and practical these suggestions must be.

The book is evidently written for the dweller or traveler in the Southwest and deals with the cacti of that desert region. Accordingly, it makes no pretense of covering the entire tribe and a brief glance through it uncovers no mention either of the odd cultivated forms of the garden or of the hardy cacti of the plains and of the East. As a popular guide to the cacti of the Southwest and as a readable and entertainingly written account of their peculiarities, this book will fill a useful place in the libraries of cactus enthusiasts and nature students.

Exploring for Plants[1]

The book with the above title is an entertaining and thoroughly human account of the author's extensive travels in foreign lands, seeking new plants for our farms and gardens. Dr. David Fairchild tells about his visits in England, to the experimental gardens of the Vilmorin's in France, to Dr. Trabut in northern Africa, and many other interesting places. Thence, Dr. Fairchild takes us across northern Africa into odd corners of the Mediterranean and the Atlantic through the tropics of Ceylon into India and Sumatra and Indo-China, and particularly emphasizes the many uses of the bamboo in Java. This is a plant with which American industry might well become more familiar. He also takes us into out of the way corners of Africa, Gambia, French Guinea, Sierra Leone, Liberia, and the Cameroons.

In all of these places he emphasizes the interesting features and the human side of the story, and unlike many travelers does

[1] Fairchild, David. Exploring for plants. Pp. i–xx + 1–591. The Macmillan Company, New York, 1930. [*illust.*] $5.00.

not seek to emphasize the hardships, which need not be excessive when one considers the fact that all of these countries are inhabited by humans who have lived quite comfortably in them all their lives. Dr. Fairchild makes his travel an adventure and makes us all want to follow his example.

FORMAN T. MCLEAN.

A GLANCE AT CURRENT LITERATURE[1]

Traveling northward by sea from England as a "privateer" botanist (the word has perhaps a different significance in England from that in America), Miss I. W. Hutchinson found many fascinating floral scenes in Greenland, of which she writes in the *Journal of the Royal Horticultural Society* for January.

In the same issue, H. F. Comber tells of his experiences in plant collecting in Tasmania.

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The *Gardeners' Chronicle of America* for March speaks especially of inducing early bloom in the garden, in articles by Edith H. Banghart and William J. Inge. *Horticulture* for March 1 places emphasis on some of the newly developed perennials. Both magazines also contain numerous other interesting articles on gardening.

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William P. Alexander tells how a fernery was developed in "Making Ferns Feel at Home" in the March number of *Hobbies,* published by the Buffalo Museum of Science.

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"North American Blackberries" is the subject of fascicle six of volume two of *Gentes Herbarum* (The Kinds of Plants), by L. H. Bailey. The issue is well illustrated with photographs.

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A cactus primer has been started in the March number of *Desert,* giving in few words and a single picture directions for planting cactus seeds at home.

[1] All these publications and many others may be found in the library of The New York Botanical Garden, in the Museum Building.

The progress of exploration in South America is reviewed by Dr. H. A. Gleason, of The New York Botanical Garden, in the January issue of the *Bulletin of the Torrey Botanical Club.* In the same issue Harley Harris Bartlett writes on investigations of the plant life of the Maya area. Material from both articles was given by the two authors before the A. A. A. S. meeting in New Orleans last winter.

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"Kitchen Gardens in the British Manner" (and who does not know and envy the charm of the little backyard garden in England!) is the title of a study in the *Bulletin of the Garden Club of America* for March. "A Moonlit Garden" and "Dwarf Conifers for the Rock Garden" are among the other interesting features of this number.

* * * * *

Delphiniums —how to select them, arrange them, and procure a succession of bloom —are treated by Dorothy E. Pletcher in the April *Nature Magazine.* Of interest to the botanist—amateur and perhaps beyond—is an article, "Tree Fruits of the Woodland," by Mary F. Robinson in the same issue.

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A new oak from the Miocene period in western United States has been discovered and named *Quercus perplexus* by Edward W. Berry. It is described and illustrated in the *Journal of the Washington Academy of Science* for April 4.

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"Blühende Kakteen und andere sukkulenten Pflanzen" is the new title of the former "Blühende Sukkulenten." Mappe 7 has just been issued, with four colored illustrations, accompanied by descriptions, in the usual exquisite style.

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The March issue of *The American Home* is specifically a gardening number, telling about tools, supplies, seeds, and bulbs to make the garden beautiful.

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Mrs. H. H. Buxton, who has lectured at The New York Botanical Garden, has contributed an article to *Horticulture* for February 15, entitled "How an Expert Makes Begonias Thrive."

From the "opulent state of Bahia, Brazil," comes a large portfolio descriptive of the resources and development of the region, especially referring to the cacao industry and to general agriculture. It is elaborately prepared, with magnificent illustrations.

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"Miniature Glass Gardens for the Home" is the title of an interesting illustrated article in the March *Bulletin of the Missouri Botanical Garden*. In the same issue is a valuable table showing which plants are affected by city smoke, and how they are injured.

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A pink-fruited lemon is reported by A. D. Shamel in the *Journal of Heredity* for January. It is said to be slightly less acid than the ordinary lemon.

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Many new hybrids among the citrus fruits are described in Circular No. 181 of the United States Department of Agriculture by Walter T. Swingle, T. Ralph Robinson, and E. M. Savage. Chief among them are a number of new tangelos, which might be described as luxury oranges. Several hybrids which might serve as substitutes for lemons or limes are mentioned, and one new lime and lemon hybrid. Another new fruit described in the circular is known as the Glen citrangedin.

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Cereals, nuts and oil seeds are taken up in volume I of Andrew L. and Kate Barber Winton's new study, "Structure and Composition of Foods." The 700 pages of text are variously illustrated. Volumes II and III are scheduled to complete the work.

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An interesting picture of plants we are accustomed to seeing only in public conservatories is given by Eileen Neuhauser in the April *Gardeners' Chronicle of America* under the title, "Botanic Gardens in the West Indies." Mildred Norton Adams in the same number tells which wild flowers to plant in the garden this spring.

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Month by month, "What to Do" in the garden is outlined by Harry R. O'Brien in *Better Homes and Gardens*. Other note-

worthy gardening articles in the March issue deal with roses and delphiniums and the planning of grounds.

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One of the most charming rock gardens yet photographed appears in the *Cactus and Succulent Journal* for March. Cacti and the Crassulaceae comprise the only material used. The garden was recently exhibited at the San Francisco Garden Club Show.

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The *Arnold Arboretum Bulletin of Popular Information* for March 29 tells about Baltic ivy, a bit of which was brought from Russia 25 years ago and is still growing successfully on the south wall of the administration building. It resembles English ivy except in the fruiting stage, but is more resistant to the cold.

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Anderson McCully writes about avalanche lilies in the *Flower Grower* for April, telling which are most willing to leave their homes beside the western glaciers to decorate one's garden. In the *Gardeners' Chronicle of America* for April, Mrs. McCully writes of some lesser known bulbs, including *Tigridia*, the Mexican flame-flower.

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Better tomatoes seem to be on the way, if recent studies of the fruit give an indication. G. B. Ramsey, of the United States Department of Agriculture, reports in *Phytopathology* for March his recent finding that the sunken, greenish section often present at the stem-end of the tomato is caused by sulphur dioxide, apparently from the fumigation given in railway cars on the road. In *Tropical Agriculture* for March, A. K. Briant concludes a prolonged study of the diseases of tomatoes in Trinidad. And, in the *Journal of Agricultural Research* for January, Ora Smith records a study of the relation of temperature to anthesis and blossom drop of the tomato. The University of Ohio has just issued "Growing of Greenhouse Tomatoes" by I. C. Hoffman in Bulletin 499.

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Among recent bulletins of interest to horticulturists of this region, all prepared by the Agricultural Experiment Stations named, are: "A Recent Investigation on Control of Apple Scab

in the Hudson Valley" (Bulletin 604, N. Y. State); "Control of Bottom Rot of Lettuce" and "Soil Acidity Studies with Potatoes, Cauliflower, and Other Vegetables on Long Island" (Bulletins 535 and 536, Cornell University); "Spraying Program and Rules for Control of Pests" (Bulletin 600, Ohio); "Mosaic Disease of Bean" (Technical Bulletin 118, Michigan State College); "Conservation of Fertilizer Materials from Minor Sources" (Miscellaneous Publication 130, United States Department of Agriculture); "Mexican Bean Beetle in Connecticut" (Bulletin 332, Connecticut); the first two of a series of "Spray Injury Studies" (Special Bulletins 218 and 219, Michigan State College); "Hot Water as an Insecticide" (Technical Bulletin 274, United States Department of Agriculture); "Aster Diseases and Their Control" (Research Bulletin 111, University of Wisconsin); and "Value of Scabby Potatoes" (No. 297, Vermont Agricultural Experiment Station).

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

The following visiting botanists have enrolled in the library during the winter:

Dr. Ernst J. Schreiner, Frye, Me.; Dr. Ivan M. Johnston and Mr. John J. Jack, Arnold Arboretum, Dr. K. B. Winton, Wilton, Conn.; Dr. Glenn G. Hahn and Mr. Theodore T. Ayers, New Haven, Conn.; Prof. L. H. Bailey, Prof. H. M. Fitzpatrick, Prof. H. H. Whetzel and Mr. J. A. B. Nolla, Ithaca, N. Y.; Dr. Edgar I. Wherry, Philadelphia, Pa.; Dr. H. W. Thurston, Jr., and Dr. George L. Zundel, State College, Pa.; Prof. Chas. S. Parker, Mr. Walter T. Swingle and Mr. J. A. Faris, Washington, D. C.; Dr. P D. Strausbaugh, Morgantown, W. Va.; Miss Olga Lakela, University of Minnesota; Dr. Mel. T. Cook, Rio Piedras, P. R.; Mr. C. Vigne, Gold Coast, Africa, and Mr. K. Mori, Matsudo, Japan.

Dr. E. D. Merrill, Director-in-Chief of The New York Botanical Garden, was honored by election to membership in the American Philosophical Society at its annual meeting held in Philadelphia on April 22, 1932.

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Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 41,700 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural, and forestal subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
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ROSALIE WEIKERT ..... *Technical Assistant*
KENNETH R. BOYNTON, B. S. ..... *Head Gardener*
G. L. WITTROCK, A. M. ..... *Docent*
ROBERT HAGELSTEIN ..... *Honorary Curator of Myxomycetes*
E. B. SOUTHWICK, PH. D. ..... *Custodian of Herbaceous Grounds*
ETHEL ANSON S. PECKHAM .. *Honorary Curator, Iris and Narcissus Collections*
WALTER S. GROESBECK ..... *Clerk and Accountant*
ARTHUR J. CORBETT ..... *Superintendent of Buildings and Grounds*

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CYPRESS TREES AND AIR-PLANTS[1]

Since the pond-cypress (*Taxodium ascendens*) has been reinstated to specific rank and further studied in comparison with the bald-cypress (*Taxodium distichum*), the distinguishing characters are becoming, though rather slowly, increasingly evident. The region inhabited by the two kinds of cypress is neither inhabited by botanists nor explored by those fearful of wet feet and wet clothes, hence the very gradual progress of our knowledge of their various characteristics.

We have been well acquainted with the differences between the species in habitat, in habit, and in foliage. However, recent observations, direct and indirect, have furnished additional characteristics by which they may be distinguished.

We have always been struck, especially in the Florida peninsula, with the abundance of air-plants growing on the stems and branches of the pond-cypress, and by the paucity of such plants on the bald-cypress. A close examination of the bark of the two kinds of cypress soon discloses the reason for this state of affairs. The bald-cypress (*Taxodium distichum*) has a rather close and relatively smooth shreddy bark somewhat similar to that of the red-cedar (*Sabina virginiana*), while the pond-cypress (*Taxodium ascendens*) is clothed with a rough furrowed bark, the scales separating in strips which are much longer than wide.

Consequently, the trunk of the bald-cypress furnishes little encouragement for the growth of air plants, either in the way of lodgment for seeds and their germination or as subsequent anchorage for plants. The most evident air-plant on the bald-cypress is

[1] These notes and illustrations, taken from observations during exploration, were made possible through the interest of friends of the Garden.

FIGURE 1. A river-cypress tree in the Okaloacooche Slough in the Big Cypress Swamp, Florida. Although this cypress is usually lacking in plants of the wild-pines (*Tillandsia*), the long-moss (*Dendropogon*) is usually present, often in great abundance. Many birds, white and pink Ibis, may be seen in the top of the tree.

the long-moss (*Dendropogon usneoides*), which requires, as may be noticed from its habit of growth, less secure anchorage than any of our other air-plants. All that is necessary is an object for its strands to fall across. The pond-cypress, however, forms quite a different object in the landscape. Instead of a large wide-branching tree draped with graceful streamers of long-moss, as is the case with the bald-cypress, we find in the pond-cypress a relatively smaller and little-branched tree, bearing dense clusters of stiff air-plants with their leaves and inflorescences bristling in all directions.

The long-moss naturally is conspicuously present on the pond-cypress as well as on the bald-cypress. Abundant too, often copiously represented, is the ball-moss (*Diaphoranthema recurvata*), which in its mode of growth completely envelopes the limbs.

Several species of the genus *Tillandsia* are among the most abundant epiphytes. Once lodged, they persist for generations,

FIGURE 2. In the Big Cypress Swamp, Florida, near the western side of the Everglades. A small pond-cypress tree as host to vigorous plants of the wild-pine, *Tillandsia polystachya*, one of our rarer species, with dark-red spikes.

as is evidenced by the dense clusters, usually of a single kind, that often would more than fill a bushel basket. Nine species are commonly represented. Sometimes all these are present in a

single cypress-strand. A half dozen species may often be found on a single small pond-cypress. These wild pines do not drape the tree or envelope the branches, but they are perched, so to speak, on the trunk and branches.

The principal species of the southern United States, with their general geographic distributions, are:

Tillandsia		
FASCICULATAE		
tenuifolia	Fla. to S. Ga.	(*W. I., C. A., S. A.*)
simulata	Pen. Fla.	(*Endemic*)
Valenzuleana	S. Fla.	(*W. I., Mex., C. A., S. A.*)
fasciculata	Pen. Fla.	(*W. I., Mex., C. A., S. A.*)
Balbisiana	S. Fla.	(*W. I., Mex.*)
polystachya	S. pen. Fla.	(*W. I., Mex., C. A., S. A.*)
circinata	S. Fla.	(*W. I., Mex.*)
UTRICULATAE		
utriculata	Fla. & SE. Ga.	(*W. I., Mex., C. A., S. A.*)
ALOIFOLIAE		
aloifolia	S. Fla.	(*W. I., C A., S. A.*)

Specific individual coloring is emphasized in the leaves, and the bracts of the inflorescences are still more highly and variously colored. These and other kinds of air-plants are often associated with the idea of shade. In fact, where they thrive, it is often almost twilight beneath the hammock roof. But on the contrary, the pond-cypress swamps furnish places for the same plants to grow in full sunlight, and in this kind of a habitat they also grow luxuriantly and show off to better advantage.

Besides several kinds of bromeliads, the pond-cypress harbors several orchids. The growth of these is not so conspicuous as that of the bromelaids mentioned above, nor are there as many different kinds present.

Four genera represented by six species are not uncommon. They are:

Polystachya minuta	S. Fla.	(*W. I., Mex., C. A , S. A*)
Encyclia tampensis	Pen. Fla.	(*Endemic*)
Amphiglottis nocturna	S. Fla.	(*W. I., Mex., C. A., S. A.*)
" *anceps*	S. Fla.	(*W. I.*)
" *difformis*	S. Fla.	(*W. I., Mex., C. A , S. A.*)
Harrisella porrecta	S. Fla.	(*W. I.*)

FIGURE 3. In a cypress head near Jupiter, Florida. The trunks of the pond-cypress trees, with their rough bark, are frequently the hosts of various species of wild-pines (*Tillandsia*). The living and spent parts of the plants persist for many years.

FIGURE 4. A pond-cypress tree in a pond in the Big Cypress Swamp, Florida. Wild-pines (*Tillandsia*) frequently decorate the trunks of this cypress; in this case it is *Tillandsia fasciculata*, one of our larger and more common species, with bright-red or yellow spikes. Many more air-plants grow higher up on the trunk. In the wet season the water rises to the top of the basal enlargement.

These are tropical orchids, most of which have not ventured so far northward as the bromeliads. Their presence is most noticeable in the vast pond-cypress swamps lying between Lake Okee-

chobee and the eastern coast, in the Big Cypress Swamp, and in the isolated pond-cypress swamp in the southern tip of the Everglades. Most of these orchids are conspicuous. In fact, all but one may easily be seen from a distance. The odd one is really the most unusual. The whole plant is so small that it almost requires a magnifying glass to find it. It is much reduced in all its parts. A complete plant consists of root and flower-stem! Leaves are wanting and the slender worm-like roots function in their stead as well as act as anchors. The yellow flowers are about as large as the head of a pin.

If cypress swamps were made up only of the pond- or river-cypresses without their epiphytes, we would be quite deprived of peculiar plant-associations which give us our wild hanging-gardens.

JOHN K. SMALL.

THE ELIZABETH ESTES BIGELOW MEMORIAL

In 1929 there was erected by an anonymous donor, an annual member of The New York Botanical Garden, the Elizabeth Estes Bigelow memorial.[1] This took the form of an attractively designed stone and timber seat with ornamental plantings, the design of the memorial and the plantings being the work of Mr. Norman Newton, who also supervised the installation. This memorial is most fittingly located at the edge of a forested area near the rock garden, the view from the seat to the south being most attractive, overlooking the iris, peony, and narcissus plantings.

The original plantings about the memorial, which is in a relatively unprotected part of the Garden, rather rapidly deteriorated, not because of the non-adaptability of the plants selected to the area, but rather because of the carelessness of the large public that visit and make constant use of this most attractive seat. The depredations, such as they were, took the form of thoughtless individuals walking through the planted border to reach the large ledge outcropping north and east of the memorial and the glade to the north. The result was naturally the formation of more or

[1] Jour. N. Y. Bot. Gard. **30**: 203–204. 1929.

FIGURE 1. The Elizabeth Estes Bigelow Memorial from the front.

less well-defined paths and the resultant breaking of the ornamental shrubs.

The donor, after a recent visit to the memorial, was much distressed at the general dilapidated appearance of the plantings, and with full appreciation of our difficulties in properly protecting developed areas from thoughtless action of the public, most generously authorized Mr. Newton to expend $500 to rehabilitate the plantings surrounding the memorial. Mr. Newton conferred with representatives of the Garden as to what could and should be done. Our coöperation with him took the form of securing quotations on the necessary and desirable plant materials and supplying the necessary labor and soil. The task of rehabilitation was consummated during the last week in April, the general results obtained being indicated in the accompanying illustrations. The selection of plant materials was carefully done with respect to ornamental effects, to the adaptability of the species selected in reference to environment, and to arranging the planting so as to minimize the chance of the public forcing a way through the borders.

Further to protect the plantings the Garden undertook the installation of a copperweld wire fence fifty feet long and four feet high, which was placed at the back of the plantings to prevent the public from approaching the memorial from the north, and copperweld trip-wires have been placed both inside and outside of the circle of ornamental plants in front of the bench.

FIGURE 2. One of the views from the Elizabeth Estes Bigelow Memorial, showing a part of the Iris Garden.

The rehabilitated plantings bring out the design of the memorial in distinct relief. It forms one of the most attractive settings in The New York Botanical Garden. The Garden is under a very great obligation to the donor for her continued interest in this memorial and in the Garden, and to Mr. Newton for the time and critical thought that he has devoted to the task of rehabilitating the plantings.

E. D. MERRILL.

NEW YORK DAHLIAS THRIVE IN ETHIOPIA

In connection with the crowning of Haile Selassie I as Emperor of Ethiopia (Abyssinia) in November, 1930,[1] the leading nations of the world sent highly placed representatives and various material tributes of respect. The United States sent a framed photograph of President Hoover, and American manufacturers were interested in sending special gifts. Mr. Franklin Adams, Counselor of the Pan-American Union and a personal friend of the American Minister Resident in Ethiopia, learned that the capital city, Addis Ababa, signified "the new flower," and that the new Emperor was personally much interested in horticulture. Although under the tropical African sun, Addis Ababa is located at an elevation of several thousand feet and enjoys one of the most wonderful climates in the world for flower-growing. This suggested the appropriateness of an American gift of "new flowers." The American Rose Society offered five hundred roses in about one hundred varieties.[2] One hundred "Amaryllis" (*Hippeastrum*) and one hundred cannas of "The President" variety were also secured. Dahlias in large numbers were contributed by the American Dahlia Society, the Baltimore Dahlia Society, and The New York Botanical Garden. Following are the letters of acknowledgment from the American Minister at Addis Ababa and the Emperor himself:

LEGATION OF THE UNITED STATES OF AMERICA
ADDIS ABABA, ETHIOPIA,
MARCH 19TH, 1931

Informal.
Doctor M. A. Howe,
New York Botanical Garden,
New York City.
Dear Doctor Howe:

The Emperor of Ethiopia is greatly pleased with the splendid collection of dahlia bulbs sent him through your intervention in connection with the recent Coronation, and has asked this Legation to express directly to you his cordial appreciation.

Your name and address, and statement of your kind interest in preparing and having sent the dahlia collection, was communicated to His Imperial Majesty by Mr. Franklin Adams, Counselor of the Pan-American Union.

[1] See The National Geographic Magazine for June, 1931.
[2] See The American Rose Annual, 1932, p. 157.

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SEHAFI TIZAZ WOLDE MESKEL

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FIGURE 1. Letter, hand-written in ink, with heading of the appended translation. The translation itself may be found on the following page.

As soon as the dahlias shall have grown the Legation will write again and tell you of results. Probably you will also later receive from the Ethiopian Foreign Office another letter of acknowledgment and expression of His Majesty's very evident pleasure.

I am, dear Doctor Howe,

Yours very sincerely,

(*signed*) ADDISON E. SOUTHARD.

THE CONQUERING LION OF JUDAH
HAILE SELLASE THE FIRST
THE ELECT ONE OF GOD, KING OF THE KINGS OF ETHIOPIA
May this reach Dr. M. A. Howe.

We extend to you Our thanks for the friendly gesture demonstrated by the token of respect which you sent Us in the shape of Dahlia Bulbs on the occasion of Our Coronation.

(*signed*) BY THE PRIVY SEAL.

A recent letter from the American minister tells of the success of the dahlias in the Ethiopian capital:

LEGATION OF THE UNITED STATES OF AMERICA
ADDIS ABABA, ETHIOPIA,
MARCH 31ST, 1932.

Mr. M. A. Howe, Asst. Director,
The New York Botanical Garden,
New York City.

Dear Mr. Howe:

I have your letter of February 23rd, 1932, inquiring as to the success of the dahlias sent out during the Coronation.

The dahlias have all done very well indeed. Most of the roots were sent, of course, to the Emperor's garden but a few were kept for the garden of the Legation. Those planted by the Emperor's gardeners did well, and large lots of splendid blooms graced the Imperial table on the occasion of at least three state dinners which I attended. He was much pleased and remarked accordingly to me.

Our Legation dahlias did even better because they had more intensive care. The Jane Cowl gave blooms which measured twelve inches across. Other varieties gave unusually big flowers, but none quite so large as the one mentioned. We are just now planting the roots dug up about Christmas time—the flowering period ran from about August to December. We were not so fortunate with the root crop as a number were eaten by ants in the ground. We shall try this year to prevent that. In summary, this climate appears very favorable for dahlias, and we are very

much indebted to you for this splendid addition to the variety of flowers in Addis Ababa.

I shall let you know in due time whether the flowers lose anything in size and splendor during their second year here. I am told that because of chilly mountain nights both flowers and vegetables take longer to mature here than in lower altitudes. Perhaps the seasonal quality of the rain has also some influence. We plant the dahlia roots, and similar kinds, in March. They are watered scantily by hand to start them—we have a shortage of water in this season—until the heavy summer rains begin around the middle of June. Heavy blooming begins in August and reaches its best about October. The rains cease near the end of September, but the ground moisture is usually sufficient to carry the plants on well towards the end of December. They then die down.

With best wishes to you, and thanking you for your interest, I am, dear Mr. Howe,

Yours sincerely,
(*signed*) ADDISON E. SOUTHARD.

This report of the thriving of dahlias in Ethiopia, a long way from their original Mexican home, will be of interest to horticulturists.

MARSHALL A. HOWE.

PORTO RICO RECORDS ITS APPRECIATION OF DIRECTOR–EMERITUS BRITTON

Following is a resolution adopted by the Committee on the Mineral Resources of Porto Rico a few days before the departure of Dr. and Mrs. N. L. Britton for New York after devoting four or five months to a continuance of their scientific surveys of the island:

GOVERNMENT HOUSE,
PORTO RICO
APRIL 15, 1932.

Resolution

This is the last of the Committee's spring meetings at which Dr. Britton will be present, and it is fitting that we turn a moment from routine business to voice our sentiments concerning his departure and the part he has played in our work.

With characteristic modesty he has disclaimed the possession of specialized knowledge to contribute to the Committee's deliberations; but we have found his familiarity with the mineral resources of Porto Rico and with the peculiar problems their exploitation presents uncannily accurate and keenly penetrative. And he has combined with this knowledge a *savoir faire* that has clarified and expedited the difficult tasks with which the Committee was faced. He has injected the system and order of science into the chaotic mass of fact and fiction with which we were confronted at the inception of our work; he has been the inobtrusive guide in the progress we have made.

For many years Dr. Britton, as Chairman of the Committee directing the Scientific Survey of Porto Rico and the Virgin Islands, has guided and inspired the vast amount of research in the natural sciences for which Porto Rico is becoming noted. He himself has made not only fundamental contributions in the field of botany, but has had a direct hand in making discoveries of the first importance in geology, paleontology, and zoology. During his quarter century of untiring and disinterested service to the island he has sometimes stepped outside the realm of pure science, to take a significant part in the applications of science. Thus far agriculture has benefited most from these departures, but this Committee has also been fortunate. We have reaped the benefits of his ripe judgment and wisdom in another field—the wresting of useful commodities, not from the soils, but from the earth itself.

To say that we regret his going would be but a feeble statement of what each one of us feels. We prize his promise to serve us in an advisory capacity, and we will avail ourselves of this treasured opportunity. But he must be more than an advisor.

This Committee cannot, therefore, approve Dr. Britton's withdrawal from its membership; the most it can consent to do is to grant him temporary leave of absence, and that on one condition only:

That he accept the Honorary Chairmanship of the Committee.

Dr. Britton, you have been elected to this office by vote of the entire Committee. We reconcile ourselves to your departure only in the knowledge that you will continue to be the guiding spirit in our labors.

GUILLERMO ESTEVES,
RAMON GANDIA CORDOVA,
W. D. NOBLE
L. SANCHEZ MORALES,
MANUEL V. DOMENECH,
HOWARD A. MEYERHOFF,
JAMES R. GRESHAM,

Committee on Mineral Resources of Porto Rico.

A GLANCE AT CURRENT LITERATURE[1]

Whether one lives on the Atlantic coast, the Pacific, or half way in between, one cannot fail to find interest in Huron H. Smith's "Ethnobotany of the Ojibwe Indians" just published as a bulletin of the Public Museum of the City of Milwaukee. The book makes good reading as well as valuable reference, and is charmingly illustrated with photographs of present-day Indians of the Great Lakes region.

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In *American Forests* for May, E. L. Crandall gives a well-illustrated lesson in wild-flower photography for amateurs. Other pictures taken by Mr. Crandall, who is a photographer for the United States Department of Agriculture, detailed to wild-flower work, appear in the same issue with an article by Archibald Rutledge.

* * * * *

What to do in a dry and sunny garden and what to do in a moist and shady place are told by Ben Arthur Davis and by Jessie F. Gould in *The American Home* for May. In the same number Dr. Forman T. McLean, of The New York Botanical Garden, writes on "What's the Modern Trend in Gladiolus?" and Frank K. Balthis gives instructions under the title "Growing Waterlilies is so Easy!"

* * * * *

British Columbia has barred the importation from the United States of gladiolus in any form, the *Gladiolus Review* for May reports. The reason is the prevalence of thrips in this country.

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Results of different fertilizing treatments on different varieties of peonies from one year to another are told in the *American Peony Society Bulletin* for March. "Peony Fertilizers and Cutting Methods" is the title of the article.

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With "Daffodil Notes" by John C. Wister and "The Narcissus Family" by Fred C. Dalikin as headliners, much of *The National*

[1] All publications mentioned here -and many others—are available in the library of The New York Botanical Garden, in the Museum Building.

Horticultural Magazine for April is devoted to spring flowers. The first-named article includes a fine series of illustrations for classification purposes.

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Her tricks for summoning successful flowers out of notably poor soil are told by Bessie Jewett Scheetz in the May number of *New Jersey Gardens.* To avoid the expense of high-priced fertilizer, the author explains, she concentrates on showy flowers that thrive in almost sterile earth.

* * * * *

In "The Partnership of Wood and Water" in *American Forests* for April, Dr. Hans Burger, of the Swiss Forest Institute, explains the effect of contiguous forest growth on stream flow, showing how floods and landslides increase with deforestation. Charts reveal the overwhelming influence of forests in checking destructive floods.

* * * * *

"Irish" potatoes came originally from Chile, T. P. McIntosh says in the *Gardeners' Chronicle* for April 9. The common potato, he points out, is said to have been developed from several wild species in South America. The potato now cultivated in Europe and America doubtless started life in Chile.

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The *Gardeners' Chronicle* has been running a valuable serial entitled "Garden Pests: Their Detection and Control." The articles, which began in early April, are well illustrated with pictures of the pests and of the damage they cause.

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The volume of Proceedings of the Seventh National Shade Tree Conference, recently issued, describes chiefly dangers to trees and how they are being met by experts.

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Further dangers besetting shade trees are treated in the *Gardeners' Chronicle of America* for May. Another article in this issue deals with "Ornamental Trees of Distinction."

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Under the title, "Ideal Home Gardens," the *Gardeners' Chronicle* (the British publication) for April 16 tells of the "Gardens

of the Novelists" exhibit which took place at Olympia in April. Sixteen gardens are described, including gardens mentioned in "The Good Companions" by J. B. Priestley, "Bleak House" by Charles Dickens, "Young Anarchy" by Philip Gibbs, and "Odyssey of an Orchid Hunter" by F. O. Burdett.

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The Proceedings of the American Society of Horticultural Science for 1931 contain nearly 700 pages of information for horticulturists, principally studies on the cultivation of fruits.

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A number of valuable articles on injuries to crop plants, particularly fruit trees, and how to treat them, are contained in the *Journal of Economic Entomology* for April. Various sprays, dusts, and other insecticides are described and criticized.

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An interesting tale of the violet, giving its history and development as a garden flower, is told by Edward A. Bunyard in *The New Flora and Sylva* for April. Napoleon is given considerable credit for the nineteenth century rage for "French violets."

Waterlilies are treated in the same issue in a beautifully illustrated article by A. Niklitschek of Vienna.

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The April number of *Gartenflora* deals with *Billbergia* in two articles, treating especially the species desirable as house plants.

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A copy of "Hortus" by L. H. Bailey and Ethel Zoe Bailey has lately been received by The New York Botanical Garden Library The book is described as "a concise dictionary of gardening and general horticulture" and as "an annotated inventory of the species of plants and their main botanical varieties now in cultivation in the United States and Canada outside of botanical gardens, experiment stations and government test grounds, special fanciers' collections, and introduction gardens, together with a brief indication of their uses and methods of cultivation."

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Two new strawberries deemed worth trying are described by George L. Slate in *Horticulture* for April 15. They are known as the Cato and Clermont varieties.

Offering the article as a digest of the introduction to a forthcoming book on the applications of botany, Emma C. Crummer, in the Transactions of the Illinois State Academy of Science for March, 1931, tells how she derived a color scheme for her home from a study of the trees surrounding it. She chose the Austrian pine as most characteristic of the surroundings, with its rich red bark, offset by a warm gray, and its needles of deep green. To make a house blend with the maple trees around it, she suggests a pure gray or light lead for body color, a fawn trim, and a green tint for the sashes. Inside her house she used the colors of the cut wood itself for walls and ceilings.

* * * * *

The little pond-sunflower which brightens streams and marshes with its blossoms in late summer, and later is even better known as beggar-ticks, with its " sticktight " burs, yields a tea known as Kokoolau in Hawaii. Otto Degener, who has done work at The New York Botanical Garden, writes about it in the April-June ish needle is the kind most commonly used as tea, he says, though issue of the *Journal of the Pan-Pacific Research Institute*. Span- a number of species of *Bidens* are thus employed. The leaves and young shoots are carefully picked and dried, placed in a calabash with water, and heated to the boiling point with clean white stones, which are pulled from the fire and dropped inside.

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The Talaud Islands, and particularly Miangas, in Oceania between the Philippines and the Netherlands-Indian part of the Malay Peninsula, have been explored by Dr. H. J. Lam, of the Botanical Garden of Buitenzorg, in Java. In issuing a report of his expedition, he says that the trip was undertaken at the suggestion made some years ago by Dr. E. D. Merrill, in the hope of finding the key to the problem of the Philippines-Moluccas-Australia floral connections.

* * * * *

Something to save for next winter's strolls is " Plant Life in Winter " by Oliver Perry Medsger in the November–December number of *Natural History*. Photographs are shown of flowers, fruits, leaves, and lichens which adorn the winter woods.

The second of the *Leaflets of Western Botany* by Alice Eastwood and John Thomas Howell deals with new and noteworthy plants of California, including descriptions of three genera of bottle-brushes.

* * * * *

The *Annals of the Missouri Botanical Garden* for February are devoted chiefly to Julius von Sachs and his contributions to botany, in honor of the hundredth anniversary of his birth. The issue contains notably articles on plant physiology as he found it and as it has developed since.

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Harold N. Moldenke, of The New York Botanical Garden, discusses tautonyms, or binomials in which the genus name is repeated to identify the species, in the March *Bulletin of the Torrey Botanical Club*. *Malus Malus* is one example he cites for what is now known as *Malus sylvestris*. He lists 228 such tautonyms, and gives accepted substitutes for each, proposing two new combinations and one new name.

CAROL H. WOODWARD.

NEW BOOKS REVIEWED

KOREAN FLOWERS AND FOLK-LORE[1]

This attractively printed volume contains well-executed colored illustrations of 148 species of Korean plants, from which one can gain a definite knowledge of their characters and possibilities as subjects for cultivation and ornament. The inclusion of rather numerous data pertaining to the folk-lore, local names, and uses of plants, with translated passages from the Korean classics, adds much to the interest of the publication. It is frankly a popular rather than a technical publication, although the Latin names of all species included are given, and should go far toward making better known the attractive native and cultivated species characteristic of the Korean flora.

E. D. MERRILL.

[1] Crane, Florence Hedleston. Flowers and folk-lore from far Korea. Pp. 1–92. *pl 1–93*. 1932. The Sanseido Co., Ltd. Tokyo and Osaka, Japan. The Macmillan Company, New York, sole American agents. $15.00.

Man and Microbes[1]

The forthcoming Chicago World's Fair in 1933 will deal primarily with the progress of science during the past century. This book by Dr. Stanhope Bayne-Jones is one of the series to be issued in connection with the celebration. It deals in the broadest manner with the ways in which microbes, particularly the bacteria and yeasts, enter into the affairs of man. Even in this brief and popular account of 128 pages, the relationship of bacteria to plant life, both as necessary aids in making nitrogen available to plants and as causing harmful diseases destroying man's crops, are dealt with quite clearly and entertainingly. While it is a small book and easily read in a leisure evening, the subject-matter provides food for thought for many evenings. It tells the relationship of bacteria to man's food supplies such as milk and cheese, to yeast, to vitamins and enzymes of beneficial service in destroying injurious insects and other pests, as well as those having injurious effects on man himself. The author suggests that the iron and sulphur bacteria which are able to live without sunlight or any source of organic matter, getting their energy from the oxidation of iron or sulphur compounds and living at very high temperatures, may have been the very first living things on our earth, and in that sense may be regarded as the remote ancestors of all of us.

Forman T. McLean.

Adventures in a Suburban Garden[2]

This is essentially an account of the personal experiences of Mrs. Wilder in her own garden at Bronxville, New York, and reminiscences of her gardening experiences in Rockland County and in Maryland. It contains interesting and stimulating suggestions for garden arrangements and color schemes and tells about many unusual plants seldom found in the average suburban flower garden. The whole is told in the picturesque language of this accomplished writer, often with lightening touches of humor. While one might wish that she would tell more about the cultural

[1] Bayne-Jones, Stanhope. Man and microbes. Pp. 1–128, *f. 1–16.* The Williams and Wilkins Company, Baltimore, Md., 1932. $1.00.

[2] Wilder, Louise Beebe. Adventures in a suburban garden. Pp. 1–250. The Macmillan Company, New York, 1931. Price, $3.50.

requirements of the plants, it will prove an interesting and stimulating book to lovers of flower gardens throughout the northeastern states.

FORMAN T. MCLEAN.

PUBLIC LECTURES DURING JUNE, JULY, AND AUGUST

Following is the program of free illustrated lectures to be given during the summer in the Museum Building of The New York Botanical Garden on Saturday afternoons at 3:30. Doors are closed at 3:30; late-comers admitted at 3:45; lectures close promptly at 4:30.

June 4. "Over the Andes and down the Amazon," Mr. Albert Smith, Assistant Curator.

June 11. "State Flowers," Mr. C. W. Johnson, Photographer.

June 18. "Mushrooms as a Hobby," Dr. William S. Thomas, Physician.

June 25. "Where Rubber Comes From," Mrs. Adele L. Whitford.

July 2. "Forestry and Forest Planting," Dr. Forman T. McLean, Supervisor of Public Education.

July 9. "Crops and Civilizations," Dr. Elmer D. Merrill, Director-in-Chief.

July 16. "Summer Wild Flowers," Dr. John Hendley Barnhart, Bibliographer.

July 23. "Lilies," Dr. A. B. Stout, Director of Laboratories.

July 30. "The Plant Life of the Sea," Dr. Marshall A. Howe, Assistant Director.

August 6. "Deserts of the Southwest," Dr. Arthur Hollick, Palebotanist.

August 13. "Jungles and Gardens in Florida and Elsewhere," Dr. H. Beaman Douglass, Physician.

August 20. "Summer Garden Flowers," Mr. Kenneth R. Boynton, Head Gardener.

August 27. "Gladiolus," Dr. Forman T. McLean, Supervisor of Public Education.

NOTES, NEWS, AND COMMENT

The New York Branch of The American Association of University Women held its annual meeting at The New York Botanical Garden on Wednesday afternoon, May 18. An inspection of the Garden grounds followed the formal meeting.

* * * *

Cool weather in New York in April and early May gave an unusual extension to the Narcissus season as well as favoring the perfection of the individual flowers. The naturalized plantings and special beds in the Botanical Garden gave conspicuous displays of color from April 10 to May 12.

* * * *

The "Flora of the Prairies and Plains of Central North America," by the late Dr. P. A. Rydberg of the Garden staff, was published on April 14. It is a well-printed book of 969 pages and 601 text-figures and it includes descriptions of 3,988 species. The New York Botanical Garden is the publisher and the price is $5.50, post-paid. It is expected that a more extended notice will appear in a later number of the JOURNAL.

* * * *

An Engelmann spruce tree, dedicated to the memory of the late Dr. P. A Rydberg, author of the "Flora of the Rocky Mountains and Adjacent Plains" and of the "Flora of the Prairies and Plains of Central North America," was planted near the courthouse at Stanford, Montana, on April 24. The ceremony was in charge of the local troop of the Boy Scouts of America. Mr. Lyle E. Goodwin, naturalist, of Lewistown, prepared a biography of Dr. Rydberg, based chiefly on that written by Dr. J. H. Barnhart and published in the JOURNAL for October, 1931, and a copy of this was locked in the concrete marker placed near the base of the tree.

* * * * *

A cabled message from Berlin, published in New York papers of May 18, announced the election of Dr. E. D. Merrill, Director-in-Chief of The New York Botanical Garden, to honorary membership in The German Botanical Society (Deutsche Botanische Gesellschaft) on the fiftieth anniversary of the founding of the Society. The number of honorary members has been kept very

small, including in 1931 only five men. Asa Gray and the late Professor Roland Thaxter, both of Harvard University, were the only Americans previously honored in this way.

* * * *

The annual Spring Inspection of The New York Botanical Garden, under the auspices of the President, Board of Managers, and the Advisory Council, was held on Monday afternoon, May 16. Among the features that received special attention were the new perennial border, designed by Mrs. Ellen Shipman and presented by the Advisory Council; the tulip display in front of Conservatory Range No. 1 and near the Rock Garden and the Rock Garden itself; the lilac collection; and, in the Museum Building, an exhibition of paintings of new native species of Iris collected in the southern states by Dr. John K. Small.

* * * *

An appeal is being made for funds to erect a bronze bust of the late Dr. John Briquet in the Conservatoire Botanique at Geneva, of which he was for many years the director and which he made "a Mecca for all botanists." In the appeal it is stated that:

"All who have attended meetings of the International Botanical Congresses—in 1900, 1905, 1910, and 1926—will realise the great loss botany has suffered by his death. At those meetings he was an outstanding figure in all discussions on nomenclature, and the rôle he played as recorder, by his tactful, sagacious and conciliatory nature, together with his great knowledge of languages and absolute command of the matter in hand, left an indelible impression on the minds of all. Thus he contributed greatly to the unifying of botanical nomenclature, and his services at the memorable Congress held at Cambridge in 1930 will long be gratefully remembered."

Subscriptions should be sent to M. le Prof. E. Wilczek, Palais de Rumine, Musée Botanique, Lausanne, Switzerland.

* * * *

Dr. Arthur Hollick has returned from a sojourn of about a month in southern California, where his special object in view was the study of the interrelations of the geological and botanical features of the arid regions. Headquarters were established at

Pasadena, and places of geological and botanical interest within a radius of about 200 miles were visited and explored as far as time permitted. Through the courtesy and generous cooperation of Mrs. A. Sherman Hoyt, trips were made possible to the Colorado Desert as far as Salton Sea, and across the Mojave Desert from Cajon Pass, via Palmdale and Mojave, to Tehachapi. Mrs. Hoyt also arranged a trip to Catalina Island in honor of Professor A. C. Seward—England's famous paleobotanist—and Doctor Hollick. Among many other places of interest visited were Blaksley Botanical Garden in Mission Canyon near Santa Barbara, wild flower fields at Arvin, near Bakersfield, Rancho La Brea tar pits at Los Angeles, Los Angeles Museum, Angeles Forest Reservation, garden of the San Fernando Mission, Arrowhead and Big Bear Lakes in the San Bernardino Mountains, and many places on the seacoast from Santa Barbara to San Diego. Pomona College, Occidental College, and the California Institute of Technology were also visited. Doctor Hollick is expected to deliver an illustrated lecture at the Garden, during the coming summer, in which certain of the most striking and interesting features observed will be described.

* * * * *

Meteorology for April. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 75° F. on the 3rd; 68° on the 7th; 59° on the 16th; *81° on the 22nd;* and 74° on the 29th.

The minimum temperatures recorded were: 30° on the 4th; *27° on the 5th;* 31° on the 15th; 34° on the 19th; and 36° on the 28th.

The total precipitation for the month was 2.34 inches. Traces of snow fell on the 27th of the month.

* * * * *

Meteorology for May. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 76° on the 4th; 83° on the 14th and the 17th; and *91° on the 26th.* The minimum temperatures recorded were: *38° on the 3rd;* 43° on the 11th; 42° on the 23rd; and 48° on the 24th. The total precipitation for the month was 3.47 inches.

PUBLICATIONS OF

THE NEW YORK BOTANICAL GARDEN

Journal of The New York Botanical Garden, monthly, containing notes, news, and non-technical articles. Free to members of the Garden. To others, 10 cents a copy; $1.00 a year. Now in its thirty-third volume.

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Memoirs of The New York Botanical Garden. Price to members of the Garden, vols. I–VI, $1.50 per volume; to others, $3.00. Vol. VII, $2.50 to members; to others, $5.00.

Vol. I. An Annotated Catalogue of the Flora of Montana and the Yellowstone Park, by Per Axel Rydberg. ix + 492 pp., with detailed map. 1900.

Vol. II. The Influence of Light and Darkness upon Growth and Development, by D. T. MacDougal. xvi + 320 pp., with 176 figures. 1903.

Vol. III. Studies of Cretaceous Coniferous Remains from Kreischerville, New York, by A. Hollick and E. C. Jeffrey. xiii + 138 pp., with 29 plates. 1909.

Vol. IV. Effects of the Rays of Radium on Plants, by Charles Stuart Gager. viii + 478 pp., with 73 figures and 14 plates. 1908.

Vol. V. Flora of the Vicinity of New York: A Contribution to Plant Geography, by Norman Taylor. vi + 683 pp., with 9 plates. 1915.

Vol. VI. Papers presented at the Celebration of the Twentieth Anniversary of The New York Botanical Garden. viii + 594 pp., with 43 plates and many text figures. 1916.

Vol. VII. Includes New Myxophyceae from Porto Rico, by N. L. Gardner; The Flower Behavior of Avocados, by A. B. Stout; Descriptions of New Genera and Species of Plants Collected on the Mulford Biological Exploration of the Amazon Valley, 1921–1922, by H. H. Rusby; and The Flora of the Saint Eugene Silts, Kootenay Valley, British Columbia, by Arthur Hollick. viii + 464 pp., with 47 plates, 10 charts, and 11 text-figures. 1927.

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THE NEW YORK BOTANICAL GARDEN
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Greenhouses, containing thousands of interesting plants from America and foreign countries.

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A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

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The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestal subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
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Contributions to the Garden may be deducted from taxable incomes.

The following is an approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be sent to

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ACCESSIONS

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JOURNAL
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PYTHIUM CROWN- AND STEM-ROT OF BEGONIA

The Begonia, popular as an ornamental both in the house and in outdoor beds, does not often suffer seriously from fungus disease. A recent case of virulent stem- and crown-rot brought to our attention by Dr. Marshall A. Howe is, therefore, of particular interest.

Dr. Howe reports that a large number of the plants in his collection at Pleasantville, New York, became infected by a rapid soft rot occurring either at the base of the stem or at some point along its length. Soon after this dark wet rot made its appearance the stalk toppled over and the plant had to be discarded. Isolations from diseased stems brought to the pathology laboratory consistently showed growth of the fungus *Pythium ~~deBaryanum~~ ultimum*. This is a common "damping off" fungus notorious in greenhouse beds, where it often takes large toll of young seedlings and cuttings of a wide variety of plants. *Pythium deBaryanum* isolated from Geranium stem-rot was reported by Braun[1] in 1925 as producing rot of Begonia cuttings upon inoculation, but an instance of such a serious natural infection as the one here described has not been found in the literature. The similar but less rapidly progressing Geranium stem-rot caused by members of the *Pythium* genus was discussed and illustrated in a recent paper[2] in this journal.

Inoculations made in our greenhouse with the *Pythium* isolated from Dr. Howe's plants resulted in the development of the

[1] Braun, Harry. Comparative studies of Pythium deBaryanum and two related species from Geranium. Jour. Agr. Res. **30**: 1043–1062. 1925.

[2] Dodge, B. O., and Swift, M. E. Black stem-rots and leaf-spot of Pelargonium. Jour. N. Y. Bot. Gard **33**: 97–103. 1932.

disease, the plants collapsing in four days. In FIGURE 1, B, is shown a plant inoculated by wounding at a point half way up the stem and placing the fungus on the wound. At A is the control plant which was wounded at a corresponding point (x) with a sterile needle. In two days the brown rot was seen progressing in both directions from the wound in plant B. On the fourth day the stem had collapsed and the rot extended up to the leaf

FIGURE 1. Pythium rot of Begonia.

bases. The fungus was reisolated from the diseased areas. Infection was also obtained by placing mycelia of the fungus in the leaf axils without wounding.

When *Pythium* has gained headway the affected plant should immediately be destroyed by burning before healthy plants in the vicinity also become diseased. The soil as well as the container in which the plant was grown should either be discarded or thoroughly sterilized before using again. Since *Pythium* is typically a soil fungus, control measures must be taken at that point. Semesan mixed with the soil about the plant bases would no doubt serve as a preventive. In extensive culture, soil sterilization by steam or by the formaldehyde treatment before planting should be carried out if the disease has been present. Crowding of the plants enhances possibility of disease spread, both through contact and through the consequent increase of moisture and temperature. Careful and moderate watering is also of importance. The usual sanitation measures including sterilization of implements which have been in contact with diseased material should be effective in controlling the disease if it threatens. Insects such as plant lice, mites, and mealy bugs, which may disseminate the fungus, should be destroyed by spraying with a contact insecticide such as Black Leaf 40.

Many economic plants suffer from fungus diseases of the roots and lower stem. *Phytophthora,* a close relative of *Pythium,* causes damping off and rot of a large number of plants, including cactus and the seedlings of trees. *Sclerotium* rot of *Delphinium, Rhizoctonia* rot of carnation, *Thielavia* rot of violet, *Verticillium* wilt of chrysanthemum, *Botrytis* rot of peony, and *Fusarium* corm rot of *Gladiolus* are some of the common fungus root troubles among the ornamentals. The value of adequate control measures for this type of soil-borne disease, and of increased information on the host range and geographical distribution of the fungi involved, is thus apparent.

MARJORIE E. SWIFT.

REACTIONS OF THE HUMAN BODY TO PLANT PARASITES[1]

The growth of one organism at the expense of another, which we speak of as parasitism, does not necessarily result in disease of the host, the organism providing the sustenance. Many plant parasites grow on other plants or on animals or human beings without causing noticeable damage.

Ability to produce disease we speak of as pathogenicity, and this depends in part on the ability of the parasite to penetrate deeply into the tissues of the host and partly on the toxic effect that it produces after invasion. But these two properties are not necessarily tied up together.

Among the protozoan parasites of animals and birds we find spirochaetes and flagellates that live in the blood and invade the tissues without poisoning the host. Harmless parasitism is still commonly found among the fungi. Most fungous parasites have little invasive power. The majority require free access to oxygen for active growth, and consequently usually live in the most superficial layers of the skin. There are exceptions to this rule, however. The yeasts which produce alcohol have the power to obtain their oxygen from carbohydrates, and some of the pathogenic yeasts can obtain sufficient oxygen from tissue and body fluids, and do invade the entire body. The pathogenic species of *Actinomyces* are also invasive. The puzzling thing about many of these parasites is their lack of ability to produce disease under experimental conditions. For example, certain forms of *Actinomyces* isolated from severe disease in animals and man never gain a foothold, and cause no trouble when injected into experimental animals. This is a problem which requires much more study before we can understand just why it is that these infections occur in certain individuals.

Some light is thrown on this problem of how fungi produce disease by the phenomena which we group under the general heading of sensitization. Studies of sensitization reactions indicate, as we shall see, that even fungi which cannot grow actively on or in the body as parasites may produce disease if they are

[1] Abstract of an illustrated lecture given at The New York Botanical Garden on Saturday afternoon, May 21, 1932.

growing in surroundings of persons who are sensitive to them. A discussion of this subject will lead us over ground which is still controversial, but might, I thought, be more interesting than restatement of well-established but trite facts.

Our present understanding of sensitization is based on old experiments as to the behavior of animals when injected with the blood-serum of other species. Diphtheria antitoxin is contained in the serum of horses which have been immunized to the poison of diphtheria bacillus, and its potency is tested by its ability to protect guinea-pigs against this poison when injected in them. Horse-serum, whether it contains antitoxin or not, is harmless to normal guinea-pigs, but it was found that if pigs which had previously received such serum were injected with it a second time at an interval of over nine days they developed convulsions and symptoms resembling human asthma and usually died within a few minutes. This so-called anaphylactic shock has been thoroughly studied and the facts which have been brought out are fundamental to our present conception of sensitization in general. The serum of the blood of these sensitized pigs if injected into normal pigs will in turn sensitize them so that they are, as we say, passively sensitized and will go into shock when injected with horse-serum just as if they had been sensitized with a previous injection of horse-serum itself. This shows that the animals sensitized by the injection of horse-serum develop in their blood-serum a substance which we call a sensitizing antibody, which confers the sensitization on another animal. The sensitizing substance is present not only in the fluid of the blood but is attached to certain cells. The muscles of the intestines or the uterus of such a sensitized pig, even when as free as possible of blood, will contract spasmodically when exposed to horse-serum.

Another important fact is that these sensitized guinea-pigs can be artifically desensitized. If a guinea-pig sensitized by an injection of horse-serum ten to twelve days previously is given a very minute amount sufficient to produce shock, but not sufficient to kill him, he will immediately after tolerate a very large amount without any symptoms whatever. Without going into the many limitations as to time and dosage governing this phenomenon, it

indicates that antibodies in the sensitized animals may be used up by such an injection and the animals made no longer sensitive.

These observations on anaphylaxis in guinea-pigs have thrown much light on many phenomena spoken of as idiosyncrasies or as allergies which bear a more or less close resemblance to typical anaphylaxis. It has long been known that the normal dose of certain drugs such as quinine or atropine, which cause only slight and rather desirable effects in most individuals, will in occasional cases make the patient extremely ill. The illness is usually accompanied by a skin eruption. A more familiar example is hay-fever, when certain individuals become sensitized to pollens floating in the air. When they inhale minute amounts of such vegetable proteins, which cause no irritation whatever in the average person, their mucous membranes react with a sudden and intense inflammation which causes the redness of the eyes, the running from the nose and the frequent asthmatic breathing seen in this disease. One of the most familiar examples of such sensitization is poisoning from ivy (*Rhus*). Many people can handle the leaves of poison ivy with impunity; they can even rub them into their skin without doing any harm. It is quite probable that any one can do this the first time he comes in contact with the plant. However, the majority of people after repeated contact become sensitized so that contact with the plant causes severe inflammation of the skin. They may be so sensitive that the minute amounts conveyed by the clothing which have touched the plants or in smoke from a fire in which the ivy is being burned will produce an intense eruption.

We need not go into important theoretical and practical differences between these so-called allergic phenomena and those of true anaphylaxis, but should remember that they exist. A point that I wish to bring out is that many protein and some non-protein substances which differ chemically from any present in the body (or, as we say, are foreign to it) may sensitize certain individuals so that they react with violent symptoms to substances which are ordinarily innocuous.

This sensitization is frequently local. Only the skin may be sensitized. For instance, many persons highly sensitive to poison ivy can chew the leaves or swallow the extract of the plant without any symptoms whatever. In other cases only the membranes

of the nose, of the bronchi or of the intestines may be sensitive. Sensitization may be limited to certain areas of the skin so that the substances which may cause no symptoms when rubbed into delicate skin over the trunk may cause a violent eruption when rubbed into what we think of as the more resistant skin of the hands. In other cases, these sensitizing substances, if swallowed and absorbed from the intestine, may produce inflammation in the sensitized area of the skin, although the membranes of the mouth and intestine and the blood vessels through which they have passed are not disturbed in the slightest by their passage.

Vegetable parasites quite harmless to one individual may produce violent symptoms in another. However, parasites may grow on unsensitized areas of the body without producing marked symptoms and yet the small amounts which are absorbed and which reach sensitized areas may cause a reaction in tissue where the parasite is not growing.

An example is the so-called trichophytid. The condition known as athlete's foot is familiar to most of us either by experience or hearsay. It is due to a fungus which grows in the outermost layer of the skin, especially in areas where the skin is kept moist such as those between the toes, on the soles, or on the palms of hands. Patients who have had such a disease for some time frequently develop skin eruptions in areas of the body in which we cannot find any fungus growing. We find that if we make an extract of the fungus and inject or rub it into the skin of such patients that it will produce an inflammation, although it produces no effect on the average person. It seems probable that such individuals have become sensitized to the fungus in certain areas of their skin and that when the fungus multiplies on one part of the body some spores or some chemical substance from it gain access to the blood stream and are carried to other areas of skin and produce the symptoms there.

We are much interested at present in conditions which we refer to as moniliids, about which we are only beginning to learn. One of the parasites of the yeast family, *Monilia albicans*, causes the disease known as thrush in the mouths of infants and occasionally in adults, but frequently grows in the intestines of adults without producing any disturbance. A few cases, however, have been observed where severe skin eruptions have developed in individuals

who harbor this monilia in their intestines, though as far as we can determine the monilia does not grow in the skin lesions. An extract prepared from it and injected into the skin will cause the development of new areas of inflammation indistinguishable from those produced by the disease. We therefore assume, although it remains to be completely proved, that these eruptions are due to the fact that the monilia is growing vigorously in the patient's intestines, that the skin has become sensitized to it, and that it was the substance absorbed from the intestines which produced the inflammation of the skin.

Another group of cases apparently due to sensitization to fungi in which we have been particularly interested are certain asthmas. It was noted some years ago by Dr. Cadham in Manitoba that some farm hands had violent asthma when working in the wheat fields, but not elsewhere. Healthy wheat and extracts of wheat caused no symptoms, but he found on the wheat a fungus parasite and observed that if these men inhaled only a very few spores of this fungus they had violent attacks of asthma. A few years ago we had a patient who had had severe asthmatic attacks ever since childhood. His observations on their appearance were extremely interesting. He remembered that he had had bad attacks as a boy when he used to crawl into a dog kennel, that he was apt to have asthma if he went into the barn or a menagerie; but contact with horses out of doors caused no symptoms. He also had severe asthma in certain houses, for example in one friend's house whenever he went to call. He associated these attacks with the fact that these were generally old houses, usually damp, and that he could frequently detect a musty odor in the room. By making cultures from dust of several different places where he had had particularly violent attacks, we found growing the same mold—an *Alternaria* which is probably chiefly a parasite found on apples, but is also not infrequent in house dust. By putting extracts of this mold in an atomizer and making him inhale a spray we were able to produce typical attacks of asthma. Since then we have had four other patients whose asthmatic attacks were associated with exposure to certain house dust, but not with the dust of all houses, whose skin reacted to tests with molds growing in these dusts and whose asthmatic attacks could be induced with a spray of the mold extract.

There is much evidence to indicate that this sensitivity to molds which are not in any sense parasites in the human body, but which grow abundantly in our surroundings, is an important factor in some cases of eczema, although as yet this suspicion has not been completely verified.

The situations in which we know we are on sure ground are the diseases where we find the fungus growing in the diseased tissue, and where we can reproduce the same type of sickness by injecting the fungus into animals. Here there can be little question that the vegetable parasite causes the disease. As to these other conditions, our knowledge is still fragmentary and the future must decide whether the fungus sensitizations are important and frequent causes of disease. Evidence is, however, accumulating that people may become sensitized to fungi originally harmless and that disease pictures which we have been hitherto unable to explain may be entirely due to reaction to fungi to which patients have become sensitized, whether these are parasites living on the patients or saprophytes growing in their environment.

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VEGETABLE PARASITES THAT ATTACK BOTH PLANT AND HUMAN LIFE[1]

Most plants of both higher and lower orders, in contrast to animals, contain chlorophyll, a green coloring matter by which they are able, with the aid of sunlight, to build up complex food substances for themselves out of water and carbon dioxide, and thus lead an independent existence. Those plants which lack chlorophyll, therefore, must suck their nourishment from the dead or living matter to which they attach themselves.

The true mistletoe, for instance, gets its vitality from trees on which it lives. The dodder, or love-vine, is a parasite on clover,

[1] Abstract of an illustrated lecture given at The New York Botanical Garden, May 21, 1932.

alfalfa, flax, and other herbaceous plants. The Indian pipe is another flowering plant lacking in chlorophyll, but it lives as a saprophyte, that is, on dead matter instead of living.

The simplest of these non-chlorophyll-bearing plants are the bacteria—tiny rod-shaped, spherical, or spiral bodies which multiply by simple division of their single cells. Bacterial diseases of man are well known. Not dissimilar are numerous bacterial diseases of plants, such as pear-blight and crown-gall, the so-called " cancer " of plants, both of great economic importance.

The yeasts, which reproduce by budding rather than fission, rank next to the bacteria in the simplicity of their structure. With their ability to produce alcoholic fermentation, they are indispensable in bread-making and in the manufacture of wines and beers.

Yeasts and yeast-like organisms are found everywhere in nature, especially in the soil and on fruits and other vegetable material. In the days when yeasts occurring naturally on the grapes were used to start the fermentation, the results were often most disconcerting. One year a good wine would result, another year it would be very inferior. This was found to be due to the fact that in addition to the wine yeast *Saccharomyces ellipsoideus,* there were present strains of the so called "wild yeasts" or Torulas, which brought about the disagreeable qualities. Thus many of the so-called " diseases " of wines and beers are due to the presence of yeasts other than those normally used in their manufacture. Usually there is great difficulty in identifying yeasts and distinguishing the pathogenic or disease-producing forms from the non-pathogenic or harmless ones.

Many of the yeasts which are found on plant life are also found in the human intestinal tract and on the skin. Some forms, the Torulas, have only the budding cell stage; others, such as *Saccharomyces* and *Willia,* form ascospores; still others produce, in addition to the budding cells and ascospores, thread-like or filamentous structures as do the more complex fungus forms. These are what the medical mycologists refer to as "monilias."

Many of these types have at some time been reported as a cause of human disease, the first being a report in 1894 by Busse and Buschke. A rounded budding yeast-like organism was isolated from an abscess of the tibia, the leg bone. Where this yeast,

Cryptococcus hominis came from or in just what manner it was able to invade and parasitize a human being is not known. Similar organisms, to which the name *Torula histolytica* has been given, have been isolated from cases of meningitis.

Perhaps the earliest of the diseases known to be due to a fungus is thrush, which was discovered in 1839 by Langenbeck. The disease is characterized by white patches in the mouth and is especially common in young infants. The causal organism is one of the "monilias," *Monilia albicans.* What appears to be an identical species causes a variety of skin lesions such as erosions between the fingers, infections of the nails and scaling at the corners of the mouth. Similar species have been isolated from certain cases of meningitis, intestinal infections such as sprue, and from pulmonary infections.

Diseases of a more severe nature are often grouped with the yeast-like infections because of the appearance of the organism in the lesion. Chief among these are the cases of so-called American blastomycosis and coccidioidal granuloma. In blastomycosis the organism *Blastomycoides dermatitidis* appears in the pus or in the tissue as large round budding thick-walled cells. These, however, as soon as transferred to artificial media, no longer bud, but produce a white filamentous fungous growth, quite different from a yeast. In coccidioidal granuloma the organism *Blastomycoides immitis,* in culture, is similar to the above. In the tissue, however, it does not bud, but produces large spherical thick-walled cells filled with spore-like bodies. This disease occurs most frequently in California and is usually fatal.

In addition to fungi having the simple structure of yeasts, others related in form to the molds cause disease both in plants and animals. Saprophytic molds are to be seen everywhere. Take, for example, the familiar picture of the loaf of bread covered with a white fluffy growth over which are scattered black fruiting bodies. It is the cause of much spoilage of strawberries, blackberries, and similar fruits. A downy mold growth is known to cause a disease of gold-fish. This is due to another species of the Phycomycetes, the water-mold, *Saprolegnia.*

The ascomycetes are the most important fungi in regard to their pathogenicity to plants. The familiar blue and green growths, *Aspergillus* and *Penicillium,* which one finds covering

old shoes or other leather goods following a long rainy spell at the beach or in any damp place, belong in this group. Some of them cause fruit rot, familiar as a blue mold on oranges and lemons. The pink mold, *Neurospora sitophila,* which is such a serious pest of bakeries, is another common example. Plant parasites in this group are of the greatest importance. The powdery mildews of lilacs, roses, and grains are familiar examples. *Claviceps purpurea,* the ergot of rye and other cereals, is a parasite which has an important use in medicine.

The third group of fungi, which have more elaborate plant bodies, are the basidiomycetes, of which the mushroom is a familiar saprophytic type. The parasites of this group cause many serious plant diseases and are of especial economic importance. The wheat rust due to *Puccinia graminis* and the orange rust of blackberry belong here; also the tree fungi, those shelf-like structures on the trunks of trees, which destroy the timber and cause, not only great economic loss to lumbermen, but also the death of many beautiful shade trees.

The group of fungi known as the " Fungi Imperfecti " or what is commonly called the waste-basket group, is a very large and important one. It contains all those forms of which the complete life history is not known. Here again one must mention those blue and green molds, *Aspergillus* and *Penicillium. Aspergillus* has been reported as causing infections of the ear in man, and species of *Penicillium,* one species of which is used in the manufacture of Roquefort cheese, have been isolated from nail infections. Some of the Imperfecti are definite plant parasites, as the *Alternaria* on apples. *Hormodendron,* a form found commonly in nature as a saprophyte, has also been known to cause disease in man.

Most of the fungi affecting man must be placed in this waste-basket group, as their complete life histories are not known. Their morphology is such that they can not be identified easily or placed in any of the well-established genera. In the genus *Blastotrichum,* however, there are apparently both saprophytic and parasitic species. The species *Blastotrichum candidum,* for instance, has been isolated from decaying twigs, whereas another species, *Blastotrichum floccosum,* has been isolated from lesions resembling eczema from human skin and is, no doubt, similar, if not

identical, with the pathogenic form, *Epidermophyton inguinale,* the cause of " Dobie itch."

The fungus diseases of man, which are innumerable, may cause more or less superficial injuries such as ringworm, or deep-seated lesions as in blastomycosis, mentioned above, in sporotrichosis described below, and in actinomycosis or lumpy-jaw of cattle. The last is caused by a very fine filamentous growth in which particles known as " sulphur granules " are found in the pus. These granules are really colonies of the fungus. A similar disease is found in man. Infection is often thought to take place from vegetable material.

Of the ringworm species there are a large number, including those of the genus *Epidermophyton,* just mentioned, of *Trichophyton,* which invade hair, nails, and skin and form one of the principal causes of " athlete's foot," and of *Microsporon,* which infect house pets as well as their masters.

Sporotrichosis, a more deep-seated disease than ringworm, is likewise due to one of the Fungi Imperfecti. Infection usually follows a wound and occurs most often in outdoor workers. The organism is prevalent in nature and has been isolated from vegetable material. It was found possible to infect carnation buds with this organism, causing a typical bud rot, thus offering proof that it is possible for a human pathogen to flourish on plant material.

RHODA W. BENHAM,
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BOTANICAL STUDIES IN EUROPE

The problem of naming collections of plants which have been acquired by The New York Botanical Garden in recent years can be met in two ways: first, by comparing the plants with descriptions of previous students, and second, by comparing the plants directly with the type specimens upon which these students' names are based. The first of these methods is often unsatisfactory, due to the ambiguity of many original descriptions. Incorrect determination of a specimen, due to misconception of the characteristics of the original collection, leads to future confusion, and ex-

perience has demonstrated that the only thoroughly satisfactory method of determining plants is by comparing them directly with types, or at least with specimens previously authenticated by this method by dependable students.

As far as the flowering plants of South America are concerned, practically none of the basic collections are deposited in American herbaria. It was the privilege of the writer to spend six months (October, 1931, to April, 1932) visiting the larger herbaria of western Europe, where direct comparisons were made between basic collections there deposited and the more recent South American collections deposited in herbaria of the eastern United States. These collections, most of which are represented by specimens in the herbarium of the Botanical Garden, had been partially named, but considerable work was still to be done. The writer's trip was undertaken with a view to helping this work towards completion. Most of the plants studied were collected in the three North Andean countries under the auspices of the Botanical Garden and coöperating institutions, for the most part by the collectors Rusby, Pennell, Hitchcock, Rose, Killip, Klug, and the writer. As a result of this trip, approximately 1,500 specimens have been named, usually by direct comparison with type material. The value for future South American studies of these authenticated specimens in the herbarium of the Botanical Garden is obvious.

Visits of several weeks were paid to the Royal Botanic Gardens, Kew, the Muséum d'Histoire Naturelle, Paris, the Conservatoire Botanique, Geneva, and the Botanisches Museum, Berlin-Dahlem. Shorter visits were made to the herbaria of the British Museum and the University of Geneva. At each of these institutions, complete facilities for work were placed at the disposal of the writer, who wishes to express his gratitude to the Directors and Curators. Among basic collections made in the region under consideration may be mentioned those of Humboldt and Bonpland, Triana, Hartweg, Goudot, Linden, Funck and Schlim, Moritz, Karsten, Jameson, André, Lehmann, and Sodiro. Their specimens, and those of many other workers in the region, are deposited in the herbaria above mentioned.

Work of the sort here described must be carried on for some time before American taxonomists who specialize in South American plants can consider themselves independent of European her-

baria. To a certain extent, photographs of type specimens can supplement this method, but in general no other means of determination is as satisfactory as direct comparison of specimen with specimen.

A. C. SMITH.

SIXTY-POUND CORM RECEIVED FROM SUMATRA

In September, 1931, the Federal Horticultural Board granted a special permit to The New York Botanical Garden to import the gigantic *Amorphophallus Titanum* of Sumatra. An order was placed with A. M. Oostingh, Fort de Kock, Sumatra, for one corm, which was delivered at the Garden on June 4, apparently in excellent condition. It weighs about 60 lbs. It had produced an inflorescence in transit, which of course was aborted because of the cramped conditions within the case in which it was packed. The corm has been placed in our Conservatory Range 1 and it is hoped that in about a year from this time it will produce flowers.

This plant belongs in the family with our common Indian turnip and the calla lily. Its great spathes attain a length of nearly 7 feet. This species was discovered in Sumatra by Beccari and was described in 1879. It occurs only in Sumatra, where it grows in rich soil in secondary forests from sea-level up to an altitude of 3,500 feet. The plant has been successfully grown at Kew and in several European botanical gardens. It is believed that this is its first importation into the United States.

E. D. MERRILL.

NEW BOOKS REVIEWED

THE BEECH FORESTS OF EUROPE[1]

Much attention has been given by botanists to the detailed structure of vegetation in limited localities, while attempt has seldom been made to correlate such local studies and to produce

[1] Die Buchenwälder Europas. Edited by E. Rübel. 502 pages, with numerous illustrations. Hans Huber, Bern and Berlin, 1932. 25 Swiss francs.

a general description of the whole extent of some plant association. The book before us is such an attempt. In it, fifteen able botanists discuss the beech forests of Europe, from England to the Caucasus, from Sweden to Spain. There seems to be no phase of the subject neglected. They describe their relation to climate, altitude, rainfall, atmospheric humidity, soil, slope, and exposure. They discuss the associated trees and the herbaceous ground-cover. Each contributor deals with the beech forests of his own country and in the last chapter the work of all is correlated and summarized by the editor. The lower altitudinal limit of beech, essentially sea-level at the north, rises to almost 1000 meters in Corsica; below this oak forests predominate. The upper limit, 300 meters at the north, gradually rises to 2000 meters at the south; above this spruce forests predominate. Beech prefers a moist and temperate climate, with the coldest month averaging but little below freezing in temperature; reasonably moist summers are essential. A great variety of soils are occupied, ranging in acidity from pH 4 to pH 8.5. Great variations in the ground-cover exist, so that the beech forest as a whole comprises ten distinct plant associations. H. A. GLEASON.

GARDENING IN THE SOUTH[1]

This little book by George R. Briggs of Greenville, South Carolina, gives sound advice in all branches of horticulture concerned with the home grounds. His advice on landscaping applies equally well to other sections of the country.

The same may be said of a large part of the book. It is sur prising how few of the plants he advises are strictly southern, most of them being quite as well suited to the northeastern states and to New England. Thus, among the dozen shade trees that he recommends are included the popular trees of the North such as ash, linden, poplar and sycamore, the only additions being chinaberry, willow oak, water oak and evergreen magnolia. His advice regarding lawns is practically limited to Bermuda grass and blue grass, the latter being recommended for shady situations. This would seem strange to us of the North who regard blue grass as sun-loving.

[1] Briggs, George R. Gardening in the South. A. T. De La Mare Company, Inc., New York City. Pp. 1–232. $2.00.

In his discussion of shrubs he introduces many plants strange to northern gardens and many, particularly among the conifers, one notes as unsuited to the South though popular here in the northern states. His advice on propagation of shrubs is perhaps his weakest part of the story, since he does not tell the methods particularly adapted for different kinds of plants, and this is very important. In his chapter devoted to roses, most of the varieties recommended are the common sorts that are most popular in the North.

His chapters on vegetable gardening, orcharding, and on insect and disease control are all told in simple language and are too brief for a real reference book, but contain excellent suggestions of local value. His calendar for the home grounds is particularly useful, as the time of doing the different gardening operations is largely governed by climate.

FORMAN T. MCLEAN.

A GLANCE AT CURRENT LITERATURE[1]

The June issue of *Desert* is devoted mostly to the genus *Dudleya* with its history. There are also valuable notes on *Haworthia.*

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Rhodora concludes in June a short series on "Botanical Evidence of a Post-Pleistocene Marine Connection between Hudson Bay and the St. Louis Basin" by David Potter. Marine fossils and living plants in now separated regions are drawn upon to promote the discussion.

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The "Plant Portraits" by T. H. Everett in the *Gardeners' Chronicle of America* for June include *Chirita lavendulacea, Pelea nummulariaefolia,* and *Tulipa Clusiana,* with their histories and rules for the cultivation of each. In the same issue are articles under the following titles: "Trough Garden," "Weeding as an Art," "Rainbows between Stepping Stones," "Giant Annuals

[1] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

to Lift Depression," " The Progress of the Rose," " The Classic Iris," " Alpine Houses," and " Essentials of Rose Culture."

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The Gardeners' Chronicle is running every other week a serial by F. Kingdon Ward on his eleventh Asiatic expedition. The explorer describes in interesting fashion his manner and route of travel, and gives word pictures and photographs along the way of new and familiar flowers and trees he found.

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The *Cactus and Succulent Journal* is continuing a series on " The Stapelieae " by Alain White and Boyd L. Sloane. One of the outstanding illustrations accompanying the June instalment is of *Duvalia polita* just after the seed-pods have burst, the silky fluff nearly obscuring the plant, and ready to take flight at the first breath of wind to bear seeds to new colonizing grounds.

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" Look to Your Trees " by C. F. Greeves-Carpenter in the June–July issue of *The American Home* tells in neighborly fashion what to do to prevent and cure injuries to trees caused by insects, improper pruning, and undernourishment.

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In a pathological study of apple cankers by Nellie A. Brown, of the United States Department of Agriculture, in *Phytopathology* for May, it is concluded that winter injury to trees, with woolly aphis as a factor in the injury, is an important agent in the promotion of canker growth. More cankers were found on trees after a severe winter, and almost none after a season such as the winter of 1930–31. Various types of bacteria and fungi were found in the cankers examined.

In the same issue, John W. Roberts and Leslie Pierce, also of the Department of Agriculture, discuss zinc-lime as a fungicide for peach trees during the growing season to prevent injury by bacterial spot, scab, and brown rot.

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In the February 1 " Preservation of Wild Flowers " bulletin of the Pennsylvania Department of Agriculture, two lists of wild flowers are given, one of flowers to be protected, one of flowers to pick. The text explains why some flowers need special protection.

"Choice Annuals that are Often Overlooked" is a leading article in *Horticulture* for May 15. Among those mentioned are the " Northern Star " chrysanthemum, Bartonia, the spider-flower (*Cleome*), new cosmos varieties, Chinese forget-me-not, Santa Barbara poppy, evening primrose, crimson flax, and certain rock-garden varieties which might well be more often planted.

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The grounds of Mount Vernon, much of which remain as planned and planted by George Washington, are described in the *Flower Grower* for June.

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

In recognition of his scientific work, especially in the field of oriental botany, Dr. E. D. Merrill, Director-in-Chief of The New York Botanical Garden, has been elected a Correspondent of the Academy of Natural Sciences of Philadelphia.

Mr. W. R. Coe of Planting Felds, Oyster Bay, N. Y., through his superintendent, Mr. Carter, has donated to the Garden cuttings of his magnificent collection of hybrids of tropical species of *Hibiscus.* These have resulted in nearly 500 plants, representing about 120 forms, which are now beginning to bloom in Conservatory Range 2.

The firm of Bobbink & Atkins, of Rutherford, N. J., has made the Botanical Garden a gift of 3,000 rose bushes, representing 330 named varieties; also 500 plants of *Hibiscus* hybrids, chiefly of the species *Hibiscus coccineus, H. Moscheutos,* and *H. oculiroseus.* The latter have been planted in the North Meadow, near the Bronx River Parkway entrance.

By exchange with the Department of Parks of Rochester, N. Y., the Garden has recently received 160 named varieties of lilac in the form of 406 rooted slips; 1,324 rooted slips, representing 19 genera and 298 species of trees and shrubs; several thousand rooted cuttings of *Daphne Mezereum;* and also 12 young trees, representing fastigiate forms (3 each) of *Ulmus, Acer, Malus,* and *Tilia.*

Professor G. Proctor Cooper III of East Lee, Massachusetts, and Mr. H. Huebner of Groton, Massachusetts, have been appointed collaborators of The New York Botanical Garden. Mr. Cooper is to visit the West Indies and South America, making collections of plants and woods. Mr. Huebner is on an expedition to the East Indies, where he will give special attention to collecting ornamental plants.

At the joint exhibit of The American Iris Society and the Massachusetts Horticultural Society held in Boston, June 8 and 9, The American Iris Society gave a special award to The New York Botanical Garden for a collection of new Louisiana Iris species never before exhibited. These were collected and described by Dr. John K. Small, were grown at the Botanical Garden, and were staged for the exhibition by Mrs. Wheeler H. Peckham.

The Boyce Thompson Institute for Plant Research in Yonkers has recently made The New York Botanical Garden an important gift of about 3400 trees and shrubs, representing about 1500 species and varieties. This large accession, with that from the Department of Parks of Rochester, mentioned above, has necessitated the provision of additional nursery space. A temporary nursery has been established in the area near Bronx Park East, once used for "war gardens." This has been enclosed by a fence and a water-supply has been installed.

The visitors to the library during the spring included the following botanists: Prof. Edgar Anderson, Arnold Arboretum, Jamaica Plain, Mass.; Prof. J. H. Faull, Cambridge, Mass.; Dr. George Hume Smith, Indianapolis, Ind.; Prof. Vernon A. Young, Syracuse, N. Y.; Prof. Harold F. Bernhardt, Philadelphia, Pa.; Prof. A. S. Hitchcock, Washington, D. C.; Prof. William Trelease, Urbana, Ill.; Prof. George W. Haley, San Francisco, Cal.; Prof. F. E. Lloyd, Montreal, Can.; Miss Bertha Lutz, Rio de Janeiro, Brazil; Prof. A. C. Seward, Cambridge, Eng.; and Mr. A. H. Lee, Manila, P. I.

ACCESSIONS

Museums and Herbarium

1 specimen of *Galaxaura obtusata* from Cuba. (Given by Dr. J. T. Roig.)

25 specimens of Haitian algae. (By exchange with the United States National Museum.)

29 specimens of Brazilian algae. (By exchange with the United States National Museum.)

17 specimens of marine algae from Greenland and Arctic America. (By exchange with the United States National Museum.)

1 specimen of *Lemanea australis*. (By exchange with the United States National Museum.)

28 Swedish marine algae. (By exchange with Dr. D. E. Hylmö.)

35 specimens of freshwater algae from the Katmai Expedition to Alaska. (Given by Prof. R. F. Griggs.)

2 specimens of *Riccia* from Texas. (Given by Dr. F. McAllister.)

2 specimens of algae from California. (Given by Mrs. Nina H. Loomis.)

305 specimens of Schiffner, Meeresalgen (Centuries II, III, and IV). (By purchase.)

5 specimens of Riccia from North Carolina. (Given by Miss Nell Henry.)

3 specimens of Myxophyceae from Kaibab National Forest, Arizona. (Given by Dr. W. T. Swingle.)

23 specimens of marine algae from Texas. (Given by Mr. Ottys Sanders.)

2 specimens of *Frullania nodulosa* from Federated Malay States. (Given by Dr. J. R. Weir.)

100 specimens of Verdoorn's "Hepaticae Selectae et Criticae," Series I and II. (By purchase.)

1 specimen of *Laurencia scoparia* from Costa Rica. (Given by Prof. Wm. R. Taylor.)

20 specimens of marine algae from North Greenland and Arctic America. (By exchange with the United States National Museum.)

3 specimens of *Chara foliolosa* from Virginia and Cuba. (By exchange with the United States National Museum.)

20 miscellaneous Musci. (Given by Miss Caroline C. Haynes.)

1 specimen of *Willeella ordinata* from India. (Given by Dr. F. Børgesen.)

25 specimens of Cuban algae. (Given by Bro. León.)

15 specimens of algae from Arkansas. (Given by Byron C. Marshall.)

1 specimen of *Riccia nigrella* from Missouri. (Given by Mr. Julian A. Steyermark.)

700 specimens of European Hepaticae (V. Schiffner's Hepaticae Europaeae Exsiccatae). (Given by Miss Caroline C. Haynes.)

4 specimens of *Chara* from Florida. (Given by Mr. G. H. Bradley.)

23 specimens of marine algae from Niuafou Island, collected by U. S. Navy Eclipse Expedition. (Given by United States National Museum.)

5 specimens of algae from Costa Rica. (By exchange with the United States National Museum.)

8 specimens of Hepaticae from Porto Rico. (Given by Prof. A. W. Evans.)

4 specimens of *Riccia fluitans*. (Given by Miss Annetta M. Carter.)

2 specimens of marine algae from Florida. (By exchange with Dr. William Randolph Taylor.)

2 specimens of *Riella americana* from Texas. (Given by Prof. R. A. Studhalter.)

12 specimens of marine algae from Atlantic City, N. J. (Given by United States National Museum.)

272 specimens of flowering plants from Indo-China. (By exchange with Mr. A. Petelot.

149 specimens of flowering plants from the Malay Peninsula. (By exchange with the Botanic Garden, Singapore.)

199 specimens from Samoa. (By exchange with Mr. E. Christopherson.)

83 specimens of Rock's Chinese plants. (By exchange with the United States National Museum.)

1 specimen of *Quercus virginiana* from South Carolina. (By exchange with Miss Marion Pellew.)

29 photographs of American Mimosaceae. (By exchange with the United States National Museum.)

17 specimens of Shepard's plants from Peru. (By exchange with Harvard University.)

120 specimens of flowering plant from California. (By exchange with the California Academy of Sciences.)

350 specimens of flowering plants from Mexico, Central America, and South America. (By exchange with the United States National Museum.)

30 specimens of Mimosaceae from North and South America. (By exchange with the United States National Museum.)

249 specimens of flowering plants from Itasca Park, Minnesota. (By exchange with the University of Minnesota.)

14 specimens of flowering plants from Ecuador. (By exchange with Yale University.)

1992 specimens of flowering plants from Bolivia. (Distributed by Dr. Otto Buchtien.)

1461 specimens of flowering plants and ferns from the southeastern United States and New Jersey. (Given by Mr. Harold N. Moldenke.)

79 specimens from Colombia. (By exchange with the United States National Museum.)

114 specimens of flowering plants from British Guiana. (By exchange with the Royal Botanic Gardens, Kew.)

150 specimens of plants from Sumatra. (By exchange with Mr. B. A. Krukoff.)

669 specimens of flowering plants from the western United States. (By exchange with the United States National Museum.)

315 specimens of plants from the United States. (By exchange with the Arnold Arboretum.)

129 specimens of flowering plants from South America. (By exchange with the Field Museum of Natural History.)

225 specimens of flowering plants from Arizona. (By exchange with the United States National Museum.)

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8 specimens of Apollinaire & Arthur's plants of Colombia. (By exchange with Harvard University.)

1 specimen of *Warea cuneifolia* from South Carolina. (Given by Mr. I. H. Burkill.)

1 specimen of *Cassiope tetragona* from Greenland. (Given by Mr. Junius Bird.)

120 specimens of flowering plants from South America. (By exchange with the Naturhistoriska Riksmuseum, Stockholm.)

72 specimens of *Laciniaria.* (By exchange with the United States National Museum.)

220 specimens from the Caroline and Marianne Islands. (By exchange with Dr. R. Kanehira.)

13 specimens of flowering plants from North Dakota. (By exchange with the South Dakota Agricultural College.)

188 specimens of flowering plants from North America, Colombia, and Peru. (By exchange with Harvard University.)

4 photographs of cacti from Argentina. (By exchange with the United States National Museum.)

24 specimens of Hinkley's plants from Peru. (By exchange with Harvard University.)

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1381 specimens of flowering plants from eastern North America. By exchange with the Philadelphia Academy of Natural Sciences.)

1 specimen of Vacciniaceae from South America. (By exchange with Harvard University.)

116 specimens from the Malay Peninsula. (By exchange with the Singapore Botanic Garden.)

1 specimen of *Linum usitatissimum crepitans* from North Dakota. (By exchange with the Bureau of Plant Industry.)

170 specimens of flowering plants from Louisiana and Florida. (Collected by Dr. J. K. Small and Mr. E. J. Alexander.)

90 specimens of flowering plants from the Philippine Islands. (By exchange with A. W. Herre.)

800 specimens of plants from Sumatra. (Given by Mr. B. A. Krukoff.)

9 specimens of grasses. (By exchange with the Smithsonian Institution.)

3 photographs of Florida orchids. (By exchange with Mr. W. M. Buswell.)

85 specimens of flowering plants from British Guiana. (By exchange with the Royal Botanic Gardens, Kew.)

14 specimens of sedges from Georgia and Florida. (Given by Mr. Harold N. Moldenke.)

709 Himalayan plants collected by W. Koelz. (Given by the Himalayan Research Institution.)

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Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 41,700 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestal subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
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Contributions to the Garden may be deducted from taxable incomes.

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I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ———.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

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JOURNAL
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WHENCE CAME THE NATIVE TREES OF THE BOTANICAL GARDEN?

At the present time, there are known to grow within the bounds of The New York Botanical Garden forty-eight different species of native trees, or about one species to every eight acres. According to our present knowledge, taxonomically considered, two classes, twelve orders, nineteen families, and twenty-eight genera are represented in this arboreous assemblage.

The New York Botanical Garden lies close to sea-level with the Atlantic Ocean only a few miles to the east. Geographically, and also climatically, it lies about equidistant from two large gulfs, the Gulf of Mexico, a thousand miles to the southwest, in round numbers, and the Gulf of Saint Lawrence to the northeast.

The land about these two marine abysses has had, at least in more recent geologic times, diametrically opposite climatic conditions—the northern one cold, the southern one warm. Naturally, different types of vegetation were developed in the two regions, and still obtain.

In Atlantic North America there are several major plant provinces. These in a general way are outlined by the boundaries of several major geologic formations. Extending northeastward from about the latitude of New York there is one of the four major provinces, technically called the New England Coast Region. This reaches its southern limit on and including most of Manhattan Island, and naturally it includes the area of The New York Botanical Garden.

Extending southwestward from about the latitude of New York lie the three other of the four major Atlantic plant-

provinces. Considered from the sea to the interior they are the Coastal Plain, the Piedmont, and the Blue Ridge. Here the New England Coast Region province not only meets but is slightly overlapped by two of the more southern provinces, for Manhattan Island is flanked on the east by Long Island, which is the northern extension of the Coastal Plain, and on the west by adjacent New Jersey, which is here represented by the northern extension of the Piedmont. The northern extension of the Blue Ridge ends some two hundred miles southwest of New York.

As a result of the methods of the white man's civilization, much of the primeval forest of the Garden tract was cleared off long ago. Although the density has been gradually reduced during the white man's occupation of America for over four centuries, the variety in kinds has apparently remained more stable. This condition may be safely assumed by a comparison of the tree flora of the Garden area with the less devastated areas near-by.

The historic biologic conditions, directly evident, were mild. The remote prehistoric conditions are also evident, but through quite a different kind of testimony—circumstantial evidence—and they were anything but mild. The conditions which prepared the site for its native flora and floristics were violent both physiologically and mechanically—fundamental climatic changes and glaciers.

After a plant population derived from the descendants of vegetation developed mostly in the Cretaceous Period had established itself, the climate hereabouts changed. A glacier ultimately covered North America as far south as Staten Island and Long Island at the east, extending westward, dipping below the Great Lakes region, and thence westward near the present Canadian boundary.

We may safely assume that the advance of the glacier was gradual. Southerly winds as a result of the cool air from the glacier flowing in to take the place of the rising warm air southward, and floods resulting from the melting of the ice-front at the edge of the glacier both helped to push or carry the seeds of trees further south, gradually extending their former ranges. The agencies of migration were also doubtless aided by the birds and mammals moving southward to escape the advancing cooling

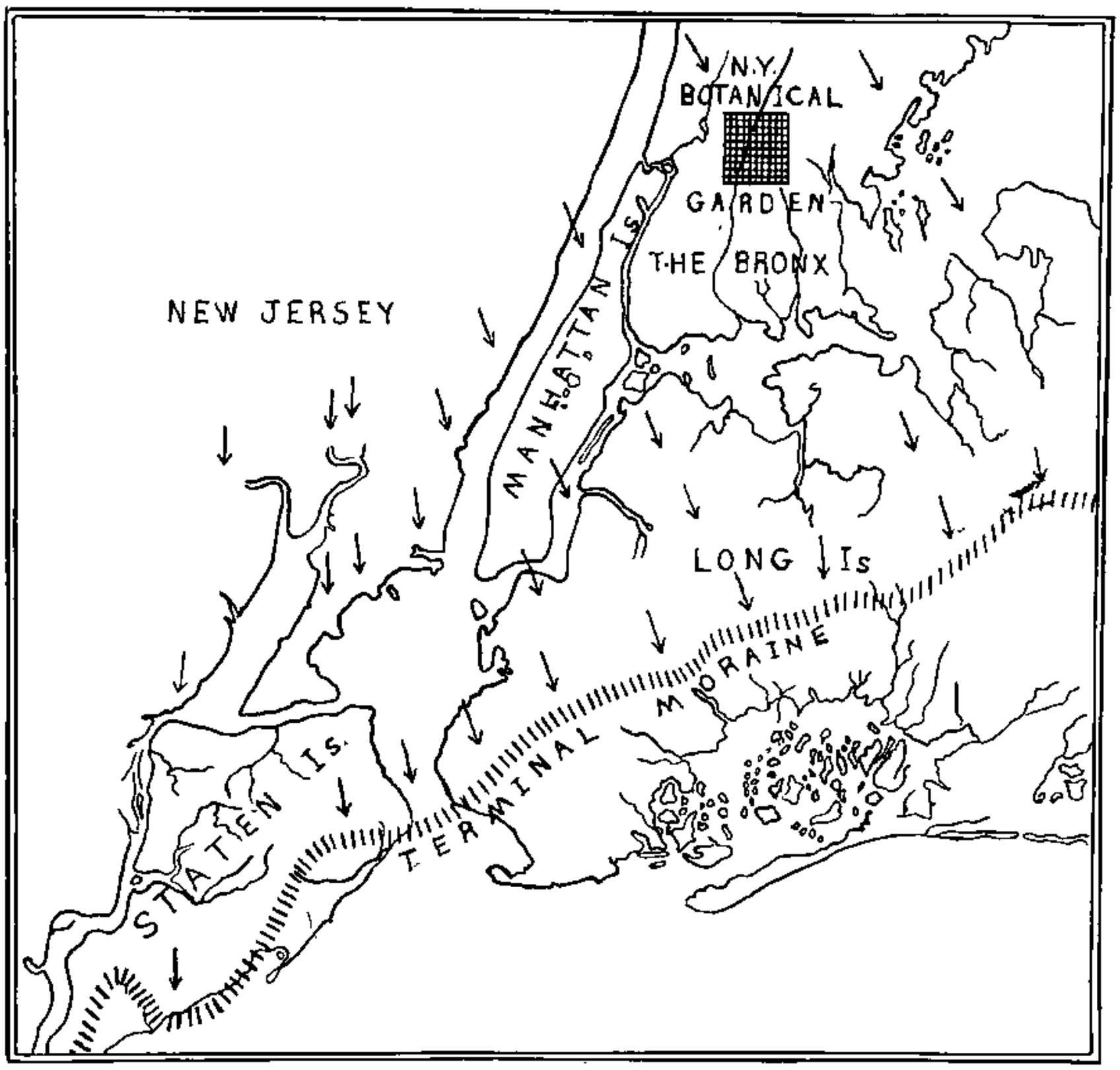

FIGURE 1. Map of the metropolitan area of the City of New York. The flow of the glacial ice is shown by the arrows. The outer terminal moraine on Staten Island and on Long Island is shown in hachure.

climate. We should not assume that all kinds of plants in the northern parts affected by the ice migrated southward. Many may have been unable to keep far enough in advance of the glacier or the cold weather, and consequently succumbed.

The present Garden site was thoroughly scoured to its foundation when the ice was at its maximum. The native soil was removed, and a new, an exotic soil-covering was deposited by the retreating ice. This naturally was devoid of plant life. The new soil-covering gradually became naturalized, so to speak, and the condition that obtained was quite different from the pre-glacial state. So the question that comes to mind is, whence the present vegetation?

As trees remained neither northward nor directly westward, the southern regions alone remain to be considered as the plant

	Fla.	Ga.	S. C.	N. C.		Del.	Pa.	N. J.	Nort
White-pine—*Strobus Strobus*		×							Newf.
Larch—*Larix laricina*		×					×	×	Lab.
Hemlock -*Tusga canadensis*		×							N. B.
Red-cedar—*Sabina virginiana*	×								Me.
Black-walnut—*Juglans nigra*	×								Mass.
Mocker-nut—*Hicoria alba*	×								Mass.
Bitter-nut -*Hicoria cordiformis* ...	×								Que.
Pig-nut—*Hicoria glabra*									Me.
Shell-bark—*Hicoria ovata*	×								Que.
Large toothed-aspen—*Populus grandidentata*				×					N. S.
American aspen—*Populus tremuloides*				×					Lab.
Glaucous-willow—*Salix discolor* ...				×					N. S.
Black-willow—*Salix nigra*	×								N. B.
Hop-hornbeam *Carpinus caroliniana*	×								N. S.
Ironwood *Ostrya virginiana*	×								N. S.
Sweet-birch—*Betula lenta*		×							Newf.
Yellow-birch—*Betula lutea*		×							Newf.
River-birch *Betula nigra*	×								Mass.
White-birch—*Betula populifolia* ...						×			N. B.
Beech -*Fagus grandifolia*	×								N. B.
Chestnut—*Castanea dentata*		×							Me.
White-oak -*Quercus alba*	×								Me.
Swamp white-oak *Quercus bicolor*	×								Me.
Scarlet-oak *Quercus coccinea*									Me.
Red-oak—*Quercus maxima*	×								Ont.
Chestnut-oak *Quercus montana* ..									Me.
Pin-oak—*Quercus palustris*				×					Mass.
Post-oak -*Quercus stellata*	×								Mass.
Black-oak—*Quercus velutina*	×								Me.
Red-mulberry—*Morus rubra* ...	×								Ont.
White-elm—*Ulmus americana*	×								Newf.
Slippery-elm—*Ulmus fulva*	×								Que.
Hackberry *Celtis occidentalis*	×								Que.
Tulip-tree—*Liriodendron Tulipifera*	×								Ont.
Sweet-gum—*Liquidambar Styraciflua*	×								Conn.
Buttonwood—*Platanus occidentalis*.	×								Me.
Wild black-cherry—*Padus virginiana*	×								N. S.
Pin-cherry -*Prunus pennsylvanica*..		×							Lab.
Sugar-maple—*Acer barbatum*		×							Newf.
Red-maple *Acer rubrum*	×								Que.
Sassafras—*Sassafras Sassafras*	×								Ont.
Sour-gum—*Nyssa sylvatica*	×								Me.
Flowering dogwood—*Cynoxylon floridum*	×								Me.
White-ash—*Fraxinus americana* ..	×								N. S.
Michaux-ash—*Fraxinus Michauxii* .				×					N. Y.
Green-ash—*Fraxinus pennsylvanica*.				×					Me.
Button-bush—*Cephalanthus occidentalis*	×								N. B.
Black-haw—*Viburnum prunifolium*.	×								Conn.

Intervening territory Virginia, West Virginia, Maryland.

reservoir which supplied the new floristics. A glance at the accompanying table of the trees now native in the Garden will show the southward geographic distribution of the species as now known.

Unless the species of the trees now in the Garden had southern distribution in preglacial time (as now indicated) most of them traveled to the southern limit—the Gulf of Mexico—during the ice ages, and maintained the ground they gained up to the present time. Thirty species or over 62 percent of those native in the Garden grow naturally in Florida and the intervening states. Seven or over 14 percent occur as far south as Georgia. Six or over 12 percent are now occurring as far south as North Carolina. One or over 2 percent now reaches Delaware, one stops short at northern New Jersey and northern Pennsylvania. Perhaps this one, *Larix*, never extended much further south, as it is one of the hardiest of northern trees.

Genera with more than one species are: hickories, four; willows, two; poplars, two; birches, four; oaks, eight; elms, two; maples, two; ashes, three.

Nearly all the present tree species may have been represented as far south as Florida in early post-glacial times. Some may have died out in the south after the far-reaching effects of the glacier subsided. Now, the white-pine, Canada-hemlock, sweet-birch, yellow-birch, chestnut, pin-cherry, and chestnut-oak do not extend south of Georgia. The ranges of American aspen, large-toothed aspen, glaucous-willow, pin-oak, and green-ash fail at North Carolina; the white birch extends as far south as Delaware; the larch fails in northern New Jersey and northern Pennsylvania.

This state of affairs represents the present distribution of the trees native in the Garden area in the region paralleling the Atlantic Ocean. The distribution of these trees when the ice-sheet receded and their subsequent evolutions we may never know fully. However, discoveries of Pleistocene plant-remains are constantly adding to our knowledge. All or nearly all the trees may have reached the southern limit at the beginning of the reconstruction, and the one-time advance guards of those just mentioned may have fallen back northward as the weather became warmer at the north. Hence the irregular distribution of the present age.

Although the arboreous floristics of The New York Botanical Garden and of Florida (or the Gulf States) are still closely related through the thirty trees which may have migrated southward during the ice-ages and are now common to the two areas, Florida records about two hundred and seventy-five additional native trees, many of which are the result of migration to the peninsula from the opposite direction or from the American tropics.

The Gulf of Mexico region has had a comparatively long and warm history. The Gulf of Saint Lawrence region has had a cool and comparatively short history. This latter condition is reflected in the relatively small number of native tree species there represented, as compared with the great number of the southern gulf. However, about the same number of the native trees of The New York Botanical Garden are represented in or near the two Gulf regions, but not the same species. In the north the conifers, poplars, and birches are better represented.

So, if the glaciated region was supplied from the southern plant reservoir, as it seems to have been, about thirty kinds of trees migrated northward beyond the latitude of the Garden and finally reached the Gulf of Saint Lawrence.

New York lies midway between the two great gulfs which largely determine the ultimate limits of plants northward and southward. What might have been the floristics of the Garden tract had not the glacier played its part in destruction and reconstruction we do not know. We do find that the present flora has a strong southern, even a Gulf State flavor. Moreover, we find the northern pines, the spruces, the firs, the northern willows, the northern birches, and the mountain-holly (*Ilicioides*) wanting in the Botanical Garden area.

JOHN K. SMALL.

RUBBER PLANTATIONS OF THE MIDDLE EAST[1]

About 1876, before rubber was as well known a commodity as it is today, Henry Wickham, a forester, visualized the domestication of the rubber tree, *Hevea brasiliensis.* He accordingly made a visit to the Amazon Valley, and succeeded in getting several thousand seeds to England, where some of them were germinated in Kew Gardens and shipped to various tropical colonies of the British government.

The first plantations were started in Ceylon under the direction of the coffee and and tea planters, who adopted the methods they were accustomed to for this new plant, making of rubber a horticultural crop. With many improvements, this method has been adopted by the so-called "European" planters of the Middle East.

The method involves the cutting of the jungle and burning of débris, in many cases removing stumps and all woody material to lessen the danger of root disease. Sometimes seed, sometimes seedlings from nursery-grown material were then planted on this newly cleared ground, on a plan of from 100 to 200 trees to the acre.

These plants were at first clean-weeded throughout life. Later it was discovered that because of the torrential rains and the continuously high temperatures throughout the year, the soil was washed away, and with it the food material. Then cover-crops were introduced, usually leguminous creepers, to prevent excessive washing and to protect the soil from strong insolation. Also terracing and bunding were introduced to help prevent soil wash. A great improvement resulted. As the crowns of the trees closed in, usually before or shortly after the trees became of tappable age, thinning operations were begun and the stand was reduced to 100 trees or less per acre.

It was soon discovered that out of 100 trees, one fourth to one third furnished a large percentage of the latex. Scientists, led by the Dutch, began to experiment with grafting buds of the branches of these high-yielding strains on seedling stocks. This worked so successfully that for a large percentage of the rubber planted by Europeans since 1925, budded stock has been used.

[1] Abstract of an illustrated lecture given at The New York Botanical Garden Saturday afternoon, June 25, 1932.

FIGURE 1. A "European" style of rubber plantation in the Middle East, with even rows of trees in clean kept grounds. A native woman is tapping the tree in the foreground. (Photograph by courtesy of United States Rubber Company.)

There are perhaps between 500,000 and 600,000 acres in the Middle East today planted in this manner out of a total planted area of nearly 8,000,000 acres. While little rubber comes from them at present, it is expected that future yields will increase the per acre capacity at least two times over that of the large areas

planted without such stock. It is hoped also to isolate the most successful trees and hybridize these to get seeds to plant directly.

But all these operations are extremely costly, and warrantable only by a high return on rubber, such as was possible a few years back.

These high prices, which were induced by the expanding uses of rubber, stimulated the indigenous population of the rubber countries to plant rubber—first the Malays of British Malaya, and afterward those in out of the way regions of Sumatra and the Dutch East Indies. The latter in traveling and migrating through Malaya on their pilgrimages to Mecca, carried back seeds to be planted at home. This was the origin of native planting. Chinese dealers furnished additional seeds, and soon large areas were planted by these non-capitalistic people.

At first, and even today, the Chinese used more or less the principles of the Europeans in their methods of cultivation, though of course with less refinement. But the natives of the Dutch East Indies and British Malaya used a system of their own. They lived primarily off the soil, growing rice, tropical fruits, and a number of vegetables. They raised a few cocoanuts and other products as money crops, but in most instances their meager money needs were met by gathering the jungle products—jelutong, resins and oils, rattan, wood, and such things. But in the production of rubber they saw the possibility of a major source of money.

Their customary food crops they raised by cutting the jungle, burning the débris, planting the rice or whatever they wanted, then letting it shift for itself until harvest. The same field would be used two or three times, then the jungle or some pernicious grass would obtain possession of the soil again, and the natives would hew a new rice-field out of the jungle. This method of agriculture prevails throughout Borneo and Sumatra.

About 1915 it was discovered by the Malays of these countries that they could plant rubber with their rice. The hard work of clearing the jungle was already done. So they planted some rubber seed with rice and watched for the results. Later they used seedling trees, setting them out thickly.

The natives had already observed that when the forest was cleared it grew up quickly with a second growth. It grew so

FIGURE 2. A young rubber plantation in native style, in which the Chinese owners have placed the rubber trees among their pineapples. Rubber is also successfully planted by the natives with rice, tapioca, and other crops. (Photo from Harry N. Whitford.)

rapidly and so thickly, in fact, that the lalang grass could not gain entrance. If they planted their rubber far apart, as at first urged by Dutch Government officials, the grass would enter and, being subject to fire, would cause the destruction of many young rubber plants. But if three or four hundred trees were planted to the acre, the canopy closed so quickly that the grass had little chance to enter. Moreover, little cultivation was necessary. The result was that the native method of thick planting, as against the open planting of the Europeans, helped to prevent the washing away and deterioration of the soil, and established quickly a rubber forest that took the place of the original jungle. Once planted, little attention was given the native gardens until they had reached maturity and were ready to tap.

It was believed for a long time that because of the small size of the trees in the native rubber "jungles" the per acre production of rubber would be low. But accurate investigations have proved that this is not so. The large number of trees per acre and the natives' drastic method of tapping the bark without regard for a twenty- to thirty-year rotation, such as the Europeans figure on, gives the natives a higher yield of rubber per acre than the white men have so far been able to get. And when a white planter calls the attention of a native to the alleged deterioration of his gardens, because of careless tapping, the native merely points to a new crop of trees arising out of the jungle, ready when those now in use are spent. Nearly half of the 8,000,000 acres of planted rubber in the Middle East is now in the hands of natives.

The native ways of planting can be classed as crude forestry methods. I have found only one European plantation on which refined forestry methods have been tried. There is much prejudice against them. But with careful budding of stock, as developed by the white men, and a small amount of regulation, it looks as though this new type of plantation might solve the problem of rubber production at low cost.

HARRY N. WHITFORD.

NEW BOOKS REVIEWED

Insects and Diseases of Ornamental Trees and Shrubs[1]

It is not always that a work designed for practical use is written by authors with the knowledge, experience, and background such as one finds in this volume on "Insects and Diseases of Ornamental Trees and Shrubs." Dr. E. P. Felt, long known as State Entomologist of New York and recently as Director of the Bartlett Tree Research Laboratories, and Dr. W. H. Rankin, Plant Pathologist in the New York State Agricultural Experiment Station at Geneva, have written one of the most readable books on this subject that has appeared in recent years.

The first chapter, written by Doctor Felt, is an account in nontechnical language of different types of life histories of insects and their depredations. This is followed by a chapter by Doctor Rankin on fungi and their depredations, in which the various groups of parasitic fungi are treated in the same way. One of the most valuable features of the work is the chapter on insecticides and fungicides, where one finds not only the directions for preparing and applying various kinds of sprays and dusts, but also important information concerning the dangers which one encounters in improperly combining sprays and failing to make thorough application of them.

Most people who are interested in growing ornamentals find certain injuries that are not caused by organisms. These are usually the most troublesome to diagnose. This subject is well covered, and such topics as root injuries, body and branch injuries, leaf injuries, injuries due to water relations, freezing, gas and smoke, and electricity are discussed briefly with suggestions for avoiding such troubles.

Part II of the work is made up mainly of revisions of selections from Doctor Felt's earlier book, "'Manual of Tree and Shrub Insects," and Doctor Rankin's work on "Manual of Tree Diseases," together with numerous additions both of plants and the organisms affecting them. Here one finds the ornamental trees and shrubs arranged in alphabetical order according to their common

[1] Felt, E. P., and Rankin, W. H. Insects and Diseases of Ornamental Trees and Shrubs. Pp. i-xix + 1–507. *f. 1–243.* The Macmillan Company, New York, June, 1932. $5.00.

names, with the insect pests and diseases treated together, so that one is not forced to consult two different works or two different chapters to find the information he is seeking.

B. O. Dodge.

An Exhaustive Local Flora[2]

In this volume the pteridophytes, gymnosperms, and monocotyledons of Graubünden are discussed from the standpoints of ecology and phytogeography. The region under consideration is the largest and easternmost canton of Switzerland, with a very rugged topography. The introduction consists of three sections. The first of these discusses past and present students of the botany of the region, and also presents a system of phytogeographic division within the canton. The principal regions, designated as Northern, Central, and Southern Alps, are divided into smaller regions, each of which is indicated by an abbreviation. The second section of the introduction gives a complete bibliography of all botanical works touching on the region, from 1573 to the present. The third section lists abbreviations of collectors and herbaria.

In the body of the volume, species, subspecies, and varieties are treated with regard to their ecological associations, and their distribution in Graubünden is given in thorough detail. A simple system of abbreviations enables the reader to find localities on the accompanying large-scale map. Altitudes are given with all citations. The volume, when the forthcoming work on dicotyledons is added to it, will provide the student of Central European plants with an excellent example of a thorough local flora.

A. C. Smith.

A GLANCE AT CURRENT LITERATURE[3]

Included in the *Year Book of the Horticultural Society of New York* for 1931, just issued, are abstracts of a number of interesting lectures that have been given before the society during the past year. Ralph Hancock has spoken on "Construction and

[2] Braun-Blanquet, J., and Rübel, Eduard. Flora von Graubünden (Erste Lieferung). Pp. 1-382. Hans Huber, Bern and Berlin, 1932.

[3] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

Planting of Rock Gardens, Dry Walls, and Flagged Walks"; Mrs. Vernon Lamson on "The Use of Roses in the Landscape"; Richard St. Barbe Baker, who has worked many years for forest conservation among native tribes in Africa, on "Men of the Trees"; Herbert W. Faulkner on "The Mysteries of the Flowers," dealing with cross-pollination, the history of its discovery, and its methods and usefulness; and William N. Craig on "Hardy Lilies for American Gardens." In addition there is a report of further findings of the Lily Disease Investigating Committee, compiled by D. K. O'Leary. Dr. A. B. Stout of The New York Botanical Garden staff is one of the members of that committee.

* * * *

A copy of the third edition of "The Indiana Weed Book" by W. S. Blatchley has lately been received by the Garden library. Not only does it describe weeds common to the State of Indiana (and, incidentally, common to much of the rest of the country), giving a picture of each, but it also contains valuable paragraphs on the dangers of weeds, their benefits, how to study and classify them, how to eradicate them, the medicinal properties of some, and which ones are poisonous to stock or to children. In an adjoining section the parts of various plants are clearly illustrated, as an aid to the amateur in identification.

* * * *

The Gardeners' Chronicle for June 18 contains a note on the death of the woad industry, remarking that the industry has been too important in the history of Great Britain to let it pass without comment. The last two woad farms in existence have ceased operations within the last two years, because of lack of demand for the dye. This note is especially interesting in view of the acquisition recently by the library of The New York Botanical Garden of J. B. Hurry's fascinating historical survey of the industry, entitled "The Woad Plant and its Dye."

* * * *

Two new extension bulletins from Cornell University will be of interest to home growers of fine flowers. No. 212, by A. C. Beal and Kenneth Post, is on China asters, while no. 220, by A. C. Beal, deals with the peony.

The puncture vine is the subject of bulletin 528 of the University of California. The state's attempt to eliminate *Tribulus terrestris* is costing $150,000 annually, says Ethelbert Johnson, author of the bulletin. With its habit of spreading with almost uncontrollable speed through fields and along roadways, and with its hard sharp-pointed burs which penetrate the casing of an ordinary tire, it is as bad for crops as it is for automobiles and airplanes. It is a native of the Sahara Desert, from where it went in earliest days around the Mediterranean, being located there in Biblical and early classical literature. From the Mediterranean it found its way, probably in the wool of imported live stock, to the ranges of western United States. Thence it followed the railroad into California, and now is being spread by automobile tires.

* * * *

Proof that plants may act as intermediate hosts for human infections is offered by Rhoda W. Benham and Beatrice Kesten in a report of experiments published in the May–June *Journal of Infectious Diseases*. The experiments were with species of *Sporotrichum*. Though *S. Poae*, a plant disease, did not seriously infect an animal, *S. Schenckii* retained its virulence for animals after living as a saprophyte or as a parasite on a plant.

* * * *

Away back in Shakespeare's day, when there was little scientific knowledge of botany, Sir Francis Bacon was predicting plant hybrids and their possible value. In *The Journal of Heredity* for April Robert C. Cook gives quotations which reveal, despite Bacon's gross ignorance of the fundamentals of botany (an ignorance characteristic of the century), remarkable predictions of the later development of the science.

* * * *

Among the "Good Shrubs Commonly Overlooked" which are mentioned by J. Horace McFarland in *Horticulture* for June 15, *Viburnum tomentosum* is given a prominent place with a picture of a clump of bushes in full bloom.

* * * *

Dr. H. A. Gleason of The New York Botanical Garden argues effectively in the May–June issue of *Torreya* for the pronunciation of botanical names according to the language one is accus-

tomed to speaking. The scientific naming of plants, he points out, represents a written rather than a spoken language, and the unfamiliarity of the root-languages in speech makes their pronunciation illogical and awkward unless transferred to the language one is using.

* * * *

Science for June 17 records the death of William Willard Ashe, pioneer forester and botanist, who was born in 1872. Besides papers on forest management, conservation, forest influences, and types, he wrote extensively on systematic botany, especially on the woody plants of southeastern United States.

* * * *

Cut all branches of pine which are affected with rust, advises an article in the June issue of *Nursery Disease Notes* from the New Jersey Agricultural Experiment Station. When *Coleosporium Solidaginis* makes its home on pine needles, it is first noticeable by the yellow bands which appear in April. Later, the needles bear flattened, orange-red fruiting structures, the spores from which infect asters and golden-rod in the vicinity. These reinfect the pines in autumn, and by spring the yellow bands appear on the needles again. The surest way to eradicate the disease is to remove the branches whose needles are infected.

* * * *

New studies of leaves and their manner of growth have been lately undertaken, and are reported by Beryl Taylor Mounts in *University of Iowa Studies,* New Series No. 233, under the title, "The Development of Foliage Leaves." Speaking of the high specialization of a leaf, she says, "Its work involves a large superficial area, multitudinous openings for gaseous exchange, an extensive series of internal air spaces, and a ramifying system of veins and veinlets for conduction and support." The object of her study is to determine the development of the islet tissues—those between the veinlets, which form the main body of the leaf. *Vitis vulpina* and *Catalpa bignonioides* are used for investigation.

* * * *

Short lessons in outdoor photography are given in *American Forests* for July by J. Horace McFarland. Long experience is necessary, he declares, to produce successful photographs, and

one's technique must be subconscious. The article is illustrated with two beautiful garden photographs and one picture of a spray of magnolia blossoms.

* * * *

In "Water Gardening" in the *Gardeners' Chronicle of America* for July, Robert T. Van Tress describes the flowers best to raise in a pool, and tells how to plant and cultivate them.

* * * *

The gardener who wishes to learn about roses will find satisfaction in Special Bulletin 222 of the Michigan State College Agricultural Experiment Station, entitled "Garden Roses." Since the days of Solomon, roses have appeared universally in gardens, writes C. E. Wildon. He then describes the types of roses popular today and tells in what sort of a location each one should be planted. He deals with the preparation of the soil, summer care and winter protection of the bushes, propagation, pruning, insects and diseases and their control. He gives the history of a number of well-known hybrids, and closes with a valuable table showing the characteristics of more than 200 varieties of roses.

* * * *

Peats for mineral improvement in the soil and peats in composts to increase nitrification and plant growth are the subjects of two papers by M. M. McCool in the June *Contributions from the Boyce Thompson Institute.* Both articles are illustrated with pictures of plants grown in various peat mixtures. The author tells what properties and combinations brought the best results in tests.

* * * *

The effect of various types of petroleum sprays on leaves is discussed by Jesse R. Green, in the *Journal of Agricultural Research* for May 15. He takes up the physical and chemical properties of each and points out the type of spray to be desired for insect riddance.

* * * *

Three quarters of the crude botanical drugs which the North American continent supplies to the rest of the world come from an area not more than 200 miles in diameter, embracing parts of North Carolina, Virginia, Kentucky, and Tennessee, according to Ina C. Oakley in "Wild Plant Industry of the Southern Appa-

lachians" appearing in *Economic Geography* for July. Two hundred of the 250 botanical drugs of the United States are found there, she points out, and are gathered wild year after year by the mountaineers. In winter, many decorative greens are picked from the same region. Forest fires, hail, drouths, and unfavorable weather conditions are the greatest perils to the gatherers.

* * * *

R. S. Williams of The New York Botanical Garden describes two new species of Himalayan mosses in *The Bryologist* for January. They were among the specimens collected by Walter Koelz for the Roerich Museum and recently received by the Botanical Garden.

CAROL H. WOODWARD.

A CORRECTION

The writer and editor of the article entitled "The Elizabeth Estes Bigelow Memorial" in the June (1932) issue of this JOURNAL much regret the transposition of names that occurred both in the title and throughout the text. The memorial is to ELIZABETH BIGELOW ESTES, as properly inscribed on the memorial itself and as reported in the JOURNAL for August, 1929.

PUBLIC LECTURES DURING SEPTEMBER, OCTOBER AND NOVEMBER

Delivered in the Lecture Hall of the Museum Building of The New York Botanical Garden, illustrated by lantern slides and otherwise; free to the public. Doors closed at 3:30; late-comers admitted at 3:45; lectures close promptly at 4:30.

September 3. "Indoor Plants in Fall and Winter," Mr. T. H. Everett, Horticulturist.

September 10. "Some Local Birds and Their Food Habits," Dr. Claude W. Leister, Curator of Educational Activities, New York Zoological Park.

September 17. "Autumn Wild Flowers," Dr. John Hendley Barnhart, Bibliographer and Administrative Assistant.

September 24. "Important Tropical Fruits," Dr. H. A. Gleason, Head Curator.

October 1. "Dahlias," Dr. Marshall A. Howe, Assistant Director.
October 8. "Jungles and Gardens in Florida," Dr. H. Beaman Douglass, Physician.
October 15. "Autumn Coloration," Dr. A. B. Stout, Director of the Laboratories.
October 22. "Grasses, the Plants of Greatest Economic Importance to Man," Dr. Elmer D. Merrill, Director-in-Chief.
October 29. "Our Native Ferns," Mr. Albert C. Smith, Associate Curator.
November 5. "Australia, Past and Present," Dr. Arthur Hollick, Research Associate in Paleobotany, and Dr. Forman T. McLean, Supervisor of Public Education.
November 12. "Crocuses and How to Use Them," Mrs. Wheeler H. Peckham, Honorary Curator of Iris and Narcissus Collections.
November 19. "Planting the Bulbs," Mr. Kenneth R. Boynton, Head Gardener.
November 26. "A Winter in Bermuda," Dr. Fred J. Seaver, Curator.

NOTES, NEWS, AND COMMENT

Doctor B. O. Dodge, Plant Pathologist at the Garden, gave a lecture on "Hybridizing Fungi" before the New York Mycological Society June 18.

Dr. E. D. Merrill, Director-in-Chief, has accepted appointment as a member of the Educational Advisory Board of the John Simon Guggenheim Memorial Foundation.

The scholarship students working at the Garden during the past few months include Miss Olga Schweizer, Mr. Luther B. Arrington, and Miss Edith S. Tomkins in plant breeding and cytology.

Dr. A. B. Stout spent a day recently at the research laboratory and garden plots of the General Electric Company at Schenectady, N. Y., inspecting the results of the X radiation of bulbs and seeds on variation and mutation.

Miss Cynthia Westcott of The New Jersey Agricultural Experiment Station, formerly of Cornell University, spent several days at The New York Botanical Garden recently, looking over the collections of parasitic fungi.

Doctors Theodore T. Ayers and Glenn G. Hahn of Yale University were at The New York Botanical Garden for several days during the month of June, continuing their work on the study of certain cup-fungi which are parasitic on coniferous trees. These gentlemen are connected with the United States Forest Service.

During the month of June Dr. C. F. Humphrey of the Philippines spent several days in the mycological herbarium of The New York Botanical Garden, looking over collections of Polyporaceae. Dr. Humphrey is planning to send collections of Philippine Polyporaceae to the herbarium of The New York Botanical Garden.

Miss Alice Aronescu, Honorary Plant Pathologist at the Institute of Agricultural Research, Bucharest, Roumania, has been pursuing graduate work for the past year leading to a degree in the Department of Botany at Columbia University. She has been carrying on research work at The New York Botanical Garden. She will continue her studies here for another year.

Doctor Myron P. Backus of Madison, Wisconsin, has for the past year been conducting his researches on the cherry leaf-spot parasite, *Coccomyces hiemalis,* at The New York Botanical Garden and Columbia University under a National Research Council Fellowship in Botany. Doctor Backus is a graduate of the University of Wisconsin, class of 1931. He has been granted a renewal of the fellowship to continue work for another year under the supervision of Doctor B. O. Dodge, Plant Pathologist of The New York Botanical Garden, and Professor R. A. Harper of the Department of Botany, Columbia University.

Mr. L. W. Miller, graduate student of the State University of Iowa, was awarded a research scholarship at The New York Botanical Garden for the month of June. Mr. Miller spent the entire month in the mycological herbarium, studying the collections of Hydnaceae, which are very rich in type material. This work is preliminary to a treatment of those groups of fungi in North American Flora. After leaving the Garden, Mr. Miller planned to spend some time in Yale and Harvard universities.

Seedling daylilies grown in connection with the work of experimental breeding at the Garden are being used for display and naturalistic plantings in various locations on the grounds. Last year such a planting was made in the north meadow under the direction of Mrs. Harold McL. Turner of the Advisory Council. The plants have thrived and during the past summer the abundance of bloom has given color to this grassy area. This season seedlings to the number of more than a thousand have been placed in masses on grassy knolls and in the margins of the woods where such plantings will show to advantage.

Meteorology for June: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: *95° F on the 5th;* 91° on the 6th; 85° on the 15th; 90° on the 22nd and 93° on the 27th. The minimum temperatures were: 56° on the 1st; *43° on the 8th;* 54° on the 19th; and 49° on the 24th. The total amount of precipitation for the month was 3.28 inches.

Meteorology for July: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: *95° on the 10th;* 91° on the 14th; 94° on the 19th; and 91° on the 28th. The minimum temperatures recorded were: *42° on the 3rd;* 57° on the 5th; 61° on the 13th and the 16th; 56° on the 25th and 57° on the 31st. The total precipitation for the month was 2.3 inches.

ACCESSIONS

Museums and Herbariums

1302 specimens of flowering plants from Haiti. (Distributed by the Smithsonian Institution.)

14 specimens of flowering plants from Cuba. (By exchange with Brother León.)

1602 specimens of flowering plants from the southeastern United States. (Collected by Mr. Harold N. Moldenke.)

55 specimens of flowering plants from South America. (By exchange with the United States National Museum.)

100 specimens, "Plantae Exsiccatae Grayanae," century 4. (By exchange with Harvard University.)

1 specimen of *Acaciella* from Florida. (Given by Dr. Hermann Kurz.)

191 specimens of flowering plants from California and Tonga. (By exchange with the University of California.)

120 specimens of flowering plants from Cuba. (By exchange with the Arnold Arboretum.)

3 specimens of flowering plants from Arkansas. (Given by Dr. and Mrs. Charles E. Moldenke.)

1 specimen of *Solidago polyglona* from Siam. (By exchange with A. F. G. Kerr.)

4 specimens of *Centaurea* and *Falcaria* from Iowa. (Given by the Iowa State College.)

209 Indian plants from Dehra Dun. (Given by the University of California, Los Angeles.)

38 specimens of flowering plants from St. Paul Island, Nova Scotia. (By exchange with Harvard University.)

156 specimens of flowering plants from Japan. (By exchange with Mr. J. Oluvi Kyoto.)

109 specimens of flowering plants from Siam. (By exchange with Dr. A. K. Kerr.)

233 specimens of Philippine plants. (Given by the Bureau of Science, Philippine Islands.)

292 specimens of flowering plants from Missouri. (Distributed by Mr. B. F. Bush.)

15 specimens of flowering plants from South America. (By exchange with the United States National Museum.)

2 specimens of *Parsonsia balsamona* from Florida. (Given by Mr. Severin Rapp.)

500 specimens of flowering plants from the Putumago River, Colombia. (Distributed by the United States National Museum.)

1136 specimens of plants from the Himalayan region, Asia. (Given by the Himalayan Research Institute.)

23 specimens of flowering plants from South America. (By exchange with the United States National Museum.)

316 specimens of Philippine Islands plants. (By exchange with the Hamburg Botanical Institute.)

22 specimens of flowering plants from South America. (By exchange with the United States National Museum.)

2 photographs of *Nemastylis* from Louisiana. (Given by Miss Caroline Dormon.)

276 specimens of plants from the Malay region. (By exchange with the Botanic Garden, Buitenzorg.)

1 specimen of *Dalbergia Stevensonii* from Honduras. (By exchange with Yale University.)

77 specimens of flowering plants from North America. (By exchange with the Missouri Botanical Garden.)

298 specimens of flowering plants from Ceylon. (Distributed by Mr. J. de Silva.)

4 specimens of Melastomataceae from Cocos Island. (By exchange with the Brooklyn Botanic Garden.)

1 specimen of *Aegiphila*. (By exchange with the Royal Botanic Gardens, Kew.)

3 specimens of flowering plants from Florida. (By exchange with Mr. Severin Rapp.)

1 specimen of *Melilotus indica* from Vermont. (Given by Miss Elsie Kittridge.)

24 specimens of flowering plants from Kwangtung, China. (Given by Mr. W. Y. Chun.)

65 specimens of flowering plants from Australia. (By exchange with the National Herbarium, South Yarra, Victoria.)

2 specimens, *Sesamum indicum* and *Meibomia supina*. (Given by Mr. Severin Rapp.)

6 specimens of flowering plants from New York. (By exchange with Mr. Frank Dobbin.)

3 specimens of *Vacciniaceae* from South America. (By exchange with the Field Museum of Natural History.)

1 specimen of *Viola floridana* from Glenwood, Fla. (Given by Dr. Philip Dowell.)

60 specimens of flowering plants from Brazil. (Given by Mrs. Ynes Mexia.)

65 specimens of flowering plants from Louisiana. (Collected by Dr. John K. Small.)

220 specimens (110 jars of seeds and 110 herbarium specimens of the plants). (Collected by Mr. Percy Wilson.)

41 specimens of flowering plants from Central America. (By exchange with the University of Michigan.)

10,000 specimens of local flora and specimens of *Carex*. (Given by Mr. K. K. Mackenzie.)

40,000 specimens of flowering plants and ferns. (The general herbarium of Mr. K. K. Mackenzie, given by him.)

16 specimens of flowering plants from Cuba. (Given by Dr. J. T. Roig.)

55 specimens of flowering plants from Cuba. (By exchange with Brother León.)

58 specimens of flowering plants from Cuba. (By exchange with Mr. J. G. Jack.)

41 specimens of flowering plants from British Honduras. (By exchange with the University of Michigan.)

3500 specimens of flowering plants from South America. (By exchange with Cambridge University.)

4 specimens of flowering plants. (By exchange with the Field Museum of Natural History.)

1062 herbarium specimens from northern South America. (Given by the American Museum of Natural History.)

126 specimens of flowering plants from Queensland. (Given by Mr. C. T. White.)

557 specimens of plants from North Dakota. (By exchange with the University of Minnesota.)

1 specimen of *Alysicarpus vaginalis* from Florida. (Given by Professor Maurice Mulvania.)

1 specimen of *Gracilaria cornea* from Brazil. (Given by W. E. Martin.)

33 specimens of marine algae from the Philippine Islands. (By exchange with the United States National Museum.)

33 specimens of miscellaneous algae and 10 specimens of mosses from Costa Rica. (By exchange with the Farlow Herbarium, Harvard University.)

7 specimens of algae from Costa Rica. (By exchange with the United States National Museum.)

1 specimen of fossil alga, *Chlorotylites Berryi.* (Given by Prof. E. W. Berry.)

2 specimens of freshwater algae from Maine. (Given by Mr. John C. Parlin.)

100 specimens (ser. III and IV) of Verdoorn's Hepaticae Selectae et Criticae. (By purchase.)

150 specimens (ser. XV, XVI, and XVII) of Schiffner's Hepaticae Europaeae Exsiccatae. (By purchase.)

1 specimen of *Riccia sorocarpa* from Guadalupe Island. (Given by the California Academy of Sciences.)

1 specimen of *Valonia macrophysa* from Italy. (By exchange with Dr. W. R. Taylor.)

2 specimens of Hepaticae (*Lejeunea minutiloba* and *Lophocolea muricata*) from Florida and South Carolina.

7 specimens of marine algae of Denmark. (By exchange with the Botanical Museum of Copenhagen.)

1 specimen of *Porella Cordaeana* from British Columbia. (Given by Mr. A. H. Brinkman.)

1 specimen of *Merismopedia convoluta* from Minnesota. (By exchange with the University of Minnesota.)

1 specimen of *Porella wataugensis* from Tennessee. (Given by Mr. Aaron J. Sharp.)

25 specimens of marine algae from Venezuela. (Given by Mr. P. L. McIntyre.)

15 specimens of marine algae from Trinidad. (By exchange with United States National Museum.)

PUBLICATIONS OF

THE NEW YORK BOTANICAL GARDEN

Journal of The New York Botanical Garden, monthly, containing notes, news, and non-technical articles. Free to members of the Garden. To others, 10 cents a copy; $1.00 a year. Now in its thirty-third volume.

Mycologia, bimonthly, devoted to fungi, including lichens; $5.00 a year. Now in its twenty-fourth volume.

Addisonia, quarterly, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Subscription price, $10.00 a year. [Not offered in exchange.] Now in its seventeenth volume.

Bulletin of The New York Botanical Garden, containing reports of the Director-in-Chief and other official documents, and technical articles embodying results of investigations. Free to all members of the Garden; to others, $3.00 per volume. Now in its fourteenth volume.

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THE NEW YORK BOTANICAL GARDEN
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THE NEW YORK BOTANICAL GARDEN
BRONX PARK, NEW YORK, N. Y.

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JOURNAL
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NOTES, NEWS, AND COMMENT

ACCESSIONS

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JOURNAL
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VOL. XXXIII SEPTEMBER, 1932 No. 393

THE CRUX OF TWISTED AND CONTORTED TREE-TRUNKS

The active principle concerned in this paper might be summed up according to the undersigned's ideas in one word, *Wind*.

TWISTED TREES

In the earlier months of 1931 (February, March, April, May, June), a series of articles on the twisting of tree-trunks appeared in *Science*. The articles concerned both coniferous and broad-leaved trees, wild as well as cultivated. This phenomenon is of such popular interest that it seems desirable to bring the main evidence recorded in the articles in *Science* together in the following five paragraphs. The several observers assigned various reasons for the twisting of the trunks.

The first writer[1] observes: "The twist may be due to a specific set induced in the process of sprouting or some other specific inheritance. Or it might be due to the prevailing counter-clockwise torque resulting from the asymmetrical pressure of prevailing westerly winds on trees with heavier foliage on the south side. Do such trees have asymmetrical foliage and do similar trees in the southern temperate zone show the reverse direction of twist as required by this hypothesis? May topographic control of foliage asymmetries and local anomalies of wind direction explain some of the exceptions noted above?"

The second writer[2] noticed that in Northampton, Mass., the elms showed a left-handed twist while the maples showed a right-handed twist. He offers no explanation for the condition.

[1] Chester K. Wentworth, *Science* II. 73: 192. 1931.

[2] Arthur

The third writer[3] records a number of observations with many details made on the eastern slope of the Continental Divide in Colorado. Three factors (or reasons) for the observed twists are recorded as: (1) direction of winter storms; (2) direction of prevailing winds during growing season; (3) natural protection, especially during the younger stages of growth.

The fourth writer[4] records his observations in the province of Ontario, Canada. His observations were confined to coniferous trees. After considerable detail, he records that: "Among the white and Norway pines the twist is far more common in trees exposed to severe weather conditions, especially to strong winds. Thus, I noted that twisted trees occurred more commonly on exposed rocky cliffs and small open islands where they received the full brunt of winter gales." According to this writer, "A twisted tree in the heart of the forest is quite rare."

The fifth writer[5] has decided that: "It probably has nothing to do with the wind or weather, but is more likely a form of tropism. A great many climbing plants twist in the same direction,"—that is, to the right. "I am strongly inclined to believe that the twist is the direct result of the influence of sunlight, similar to the turn of the sunflower ————————."

These several notes in *Science* called to mind a photograph, here reproduced, taken several years ago on the kitchenmiddens north of Mosquito Inlet on the eastern coast of Florida.

This live-oak (*Quercus virginiana*), shown in FIGURE 1, grew between two almost adjacent middens. It is situated on the edge of the more northern one, but near enough to the base to have its roots anchored in the underlying sand, beneath a thin layer of shells.[6] In the picture one is facing the west, and the Halifax River (Lagoon) may be seen in the distance. The tree stands in a gap, but nearer to the slope of the more northern midden. The prevailing winds, working on the sails (branches) of the oak from infancy, have caused an almost complete spiral twist in the trunk, which is now more than two feet in diameter.

[3] W. C. Yeager, *Science* II. **73**: 393. 1931.
[4] A. R. Cahn, *Science* II. **73**: 561. 1931.
[5] Bertram T. Butler, *Science* II. **73**: 674. 1931.
[6] This anchorage is mentioned for a reason that will appear on a following page.

FIGURE 1. A live-oak (*Quercus virginiana*) standing between two kitchenmiddens near Mosquito Inlet, Florida, with a conspicuous twist in its trunk. The prevailing wind, directed by the contour of the middens against the longer branches and consequently with much more sail on the right-hand side, served to twist the tree trunk from youth.

The cases of twist mentioned on the preceding pages represent long periods of growth—the lifetime of the individual trees concerned—and usually involve the whole length of the trunk.

There is another method of twisting that may occur in a second of time. Such an example is shown in FIGURE 2. This was the

FIGURE 2. Two pine trees (*Pinus caribaea*) in the northern part of Miami. These trees were in the path of a "twister" incorporated in a hurricane. With very little sail, as shown in the standing pine trees, the wind twisted and broke, in two places, these trees, perhaps in a second of time.

FIGURE 3. A live-oak tree on a kitchenmidden along the Halifax River (Lagoon), Florida. Insecurely anchored, this tree was buffeted by winds and storm from youth, and gradually developed into the misshapen structure shown

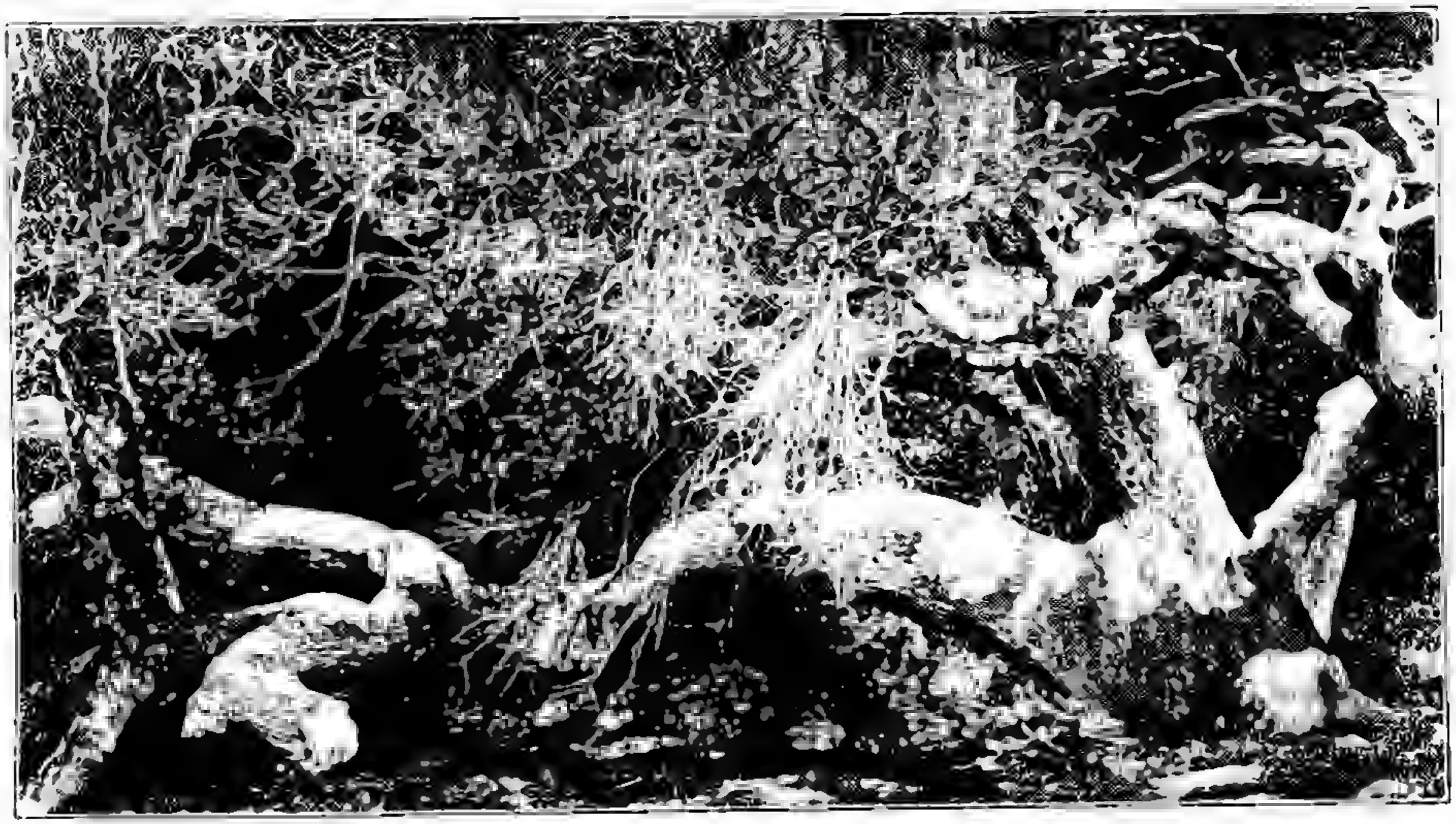

FIGURE 4. A live-oak tree on a kitchenmidden along the Halifax River (Lagoon), Florida. This tree has been the victim of poor anchorage and many storms. Similar trees are common on the kitchenmiddens of the Florida coast.

result of a "twister" incorporated within a hurricane the Florida hurricane of 1926—in which the general wind velocity was between 150 and 200 miles an hour. Naturally the trees in the cases shown did not survive, but, in cases where the tree-trunk was not seriously damaged by a less complete twist, a tree might keep on growing. In this case the twist in the trunk, when observed in future years, would be seen to be localized.

Contorted Trees

The tree shown in FIGURE 1 has neighbors and associates—other trees of the same species, *Quercus virginiana*. The specimen in this FIGURE 1 looks like a tree. The reason is that it is firmly anchored in sand by its roots. Some of its associates, such specimens as are shown in FIGURES 3 and 4, are neither *shrubs* nor *trees*. A standardized term wanting, they might be labeled *arboreous vines*.

These specimens from youth were insecurely anchored in loose shell-piles. Whereas sand will pack securely, a "soil" of shells is always loose. Among the shells (oyster, clam, conch, and the smaller shells of the near-by ocean and lagoon) is a certain amount of humus derived from various sources—dust, decayed plants, table-refuse, bones of animals and humans, charcoal, etc.—but most of the interstices are filled with air. If a tree were allowed to grow to maturity on a kitchenmidden without the vicissitudes resulting from storms, its roots might be able to maintain its trunk in an upright position. However, the root-system of a young tree in loose material is insufficient to hold the trunk firmly erect. As it is, the seedling oak, after it has developed sail enough by its branches and leaves, is blown over in one direction by a storm. It never recovers its erect position, and is blown at another angle or in the opposite direction by another storm. The tree may be battered about for many years before its anchorage is firmly established, but the damage is done and the whole growth is misshapen—trunk and branches. It continues to make sail, and even if the anchorage is firm the storms working on the younger parts continue the work of deformation. The ultimate result is a collection of curved, twisted, and contorted branches, resembling a mass of writhing saurians.

JOHN K. SMALL.

THE ALWIN BERGER SUCCULENT HERBARIUM

The Herbarium of Succulent Plants formed by the late Mr. Alwin Berger, accession of which was recorded in the last Annual Report of the Director-in-Chief,* has now been mounted, arranged, and distributed into the General Herbarium of the Garden. It proves to be one of the most noteworthy and valuable special collections ever obtained by us, and supplements the representation of many genera and species, also adding specimens of many species not hitherto obtained. The Cacti include specimens or drawings, or both, of over 500 species; the beautifully accurate pencil-drawings of flowers and fruits are of especial importance. Of the Stonecrop Family there are over 140. Of *Aloe* there are 160, of *Euphorbia* and related genera 65, of *Stapelia* 52, of *Mesembryanthemum* 66, and of miscellaneous genera and species over 50. Thus, of succulent plants of all categories, the collection contains over 1000 species. Manuscript notes and descriptions accompany many of the specimens.

Mr. Berger was for many years in charge of the extensive collections of plants in the grounds of La Mortola, on the Italian Riviera, the estate of the late Sir Thomas Hanbury. The climate there is well adapted to the cultivation of an enormous number of kinds of plants from warm-temperate and subtropical regions, and a specialty was made of succulents. Mr. Berger studied these intensively, added greatly to knowledge of them by numerous publications, and preserved herbarium specimens for record and reference, which have now become the property of The New York Botanical Garden, where they are available for students of botany and horticulture. We are indebted to Professor L. H. Bailey for informing us of the opportunity to obtain this collection from Mrs. Elise Berger.

N. L. Britton,
Director Emeritus.

* Bull. N. Y. Bot. Gard. 14: 319. 1932.

ALWIN BERGER

Alwin Berger was born 28 August 1871, at Möschlitz, near Schleiz, in Thuringia. He attended school at Schleiz, and early began his career as a gardener at Ebersdorf. Later he worked in the botanic gardens at Dresden, Greifswald, Freiburg, and Frankfurt-am-Main. In 1897 he became curator of Sir Thomas Hanbury's famous garden at La Mortola, Italy. During his eighteen years in this position he devoted much time to the study of succulent plants and developed a world-wide reputation as one of the foremost authorities in this field. His first important contribution to the subject was his revision of the genus *Cereus*, published in 1905 in the sixteenth report of the Missouri Botanical Garden. This was followed by "Sukkulente Euphorbien" (dated 1907, but actually issued in 1906), "Mesembryanthemum und Portulacaceen" (1908), the treatment of *Aloineae* in "Das Pflanzenreich" (1908), "Stapelien und Kleinien" (1910), "Hortus mortolensis" (1912), and "Die Agaven" (1915). In 1915 the world war made his continuance at La Mortola unsafe, and he took charge of the gardens of the king of Württemberg, at Stuttgart, for several years. From 1923 to 1926 he was on the staff of the experiment station at Geneva, New York, then returning to Stuttgart as head of the botanical section of the natural history museum there. His later volumes were "Die Entwickelungslinien der Kakteen" (1926), "Kakteen" (1929), and the treatment of the *Crassulaceae* in the second edition of "Das natürlichen Pflanzenfamilien" (1930). Throughout his career he was a frequent contributor to the periodical literature of horticulture. When his work was interrupted by his final illness, he was engaged upon a handbook on the *Crassulaceae* and one on *Aloe*. He died at Cannstatt, near Stuttgart, 20 April 1931, in his 60th year.

JOHN HENDLEY BARNHART.

T. H. EVERETT APPOINTED HORTICULTURIST

T. H. Everett, a graduate of The Royal Botanic Gardens at Kew, where he won high honors, became Horticulturist for The New York Botanical Garden on August 1. His principal work will be the construction of a new rock garden and the rearrangement of the conservatory plantings in a naturalistic manner.

T. H. Everett

Mr. Everett comes to the Botanical Garden directly from the H. E. Manville estate in Pleasantville, N. Y., where, as head gardener for the past four and a half years, he has developed one of the finest rock gardens in the East. During his period there he returned once to England to receive a National Diploma in Horticulture, considered the highest professional qualification obtainable by gardeners and horticulturists.

Upon his graduation from Kew in 1927, Mr. Everett was offered the post of assistant director of the Botanic Garden at Victoria, in the British Cameroons, West Africa, but declined in order to come to the United States. Here he first worked for a short time at the Untermeyer estate in Yonkers. Mr. Everett has been active as a writer and lecturer on horticultural subjects, and has exhibited at numerous flower shows. He also serves on several committees for the Horticultural Society of New York.

STUDY COURSES ANNOUNCED FOR 1932 33

Several new courses have been arranged for study at The New York Botanical Garden during the coming autumn, winter, and spring.

Practical training in handling living plants will be given in a course of 20 credit-hours starting September 17. Two days later a three-term course on plant ecology will begin, with Dr. Forman

T. McLean as lecturer. Dr. H. A. Gleason will direct the second term, commencing January 9, and will continue, assisted by other members of the staff, through the third term, ending June 12.

In early summer a three-weeks course on native ferns and their allies will be given on the Garden grounds. This year for the first time a course in bird study will be given, emphasizing food habits. Miss Helene Lunt will direct the group Sunday mornings in a fall, an early spring, and late spring series.

The complete list of courses, with their fees and credit-hours, follows:

1—Plants and Their Home Environments.

a—Ecological Physiology, by Dr. Forman T. McLean.

Deals with the environmental conditions which control plant distribution, and the structural adaptations of the plants to environment. 9 illustrated lectures. Monday afternoons, 4:30 P. M. to 5:30 P. M., September 19 to November 14 inclusive, and examination November 21. Fee, $5.00. Credit 10 hours.

b—Plant Societies, by Dr. H. A. Gleason.

Deals with the development and character of plant associations, particularly in the region around New York. 9 illustrated lectures, Monday afternoons, January 9 to March 6 inclusive, 4:30 P. M. to 5:30 P. M., and examination March 15. Fee $5.00. Credit 10 hours.

c—Plant Geography, by Dr. H. A. Gleason and other members of the Staff.

A series of 9 illustrated talks on the principal plant associations of the United States and of the world, with special emphasis on the plant life around New York. Monday afternoons, April 10 to June 12, inclusive, 4:30 P. M. to 5:30 P. M., and examination June 19. Fee $5.00. Credit 10 hours.

2—Plant Culture.

Practical training in handling living plants, including greenhouse practice in the growing of seeds and pot plants, and experiments with them suitable for school demonstrations. Saturday afternoons, 1 to 3 P. M., September 17 to November 19 inclusive. Fee $10.00. Credit 20 hours.

3—Midwinter Gardening, under the direction of Dr. Forman T. McLean, Mr. T. H. Everett and other invited lecturers.

A series of practical demonstrations accompanied by actual work with plants in the greenhouse, Conservatory Range 2. Saturday afternoons, 2 P. M. to 4:30 P. M., December 3, 10, 17, and January 7 to February 25 inclusive. Fee $15.00. Credit 30 hours.

4—Systematic Botany of Flowering Plants, under the direction of Dr. H. A. Gleason.

Introductory lessons in classifying and identifying the Angiosperms, by means of the analytical keys in botanical text-books. An excellent introduction to the study of the local flora. 15 lessons, 2 hours each. Tuesday afternoons, 4:10 to 6 P. M., March 7 to June 20, omitting Easter vacation week. Fee $10.00. Credit 30 hours.

5—Spring Gardening, under the direction of Dr. Forman T. McLean and the Gardening Staff of the Botanical Garden.

10 sessions of three hours each in practical gardening in the greenhouse and outdoors. March 1 to May 3. Plants are started in the greenhouse, grown by the members of the class, and taken to their own gardens in May.

a—Introductory—Deals with the elementary principles of gardening, 9:30 A. M. to 12:30. Wednesday mornings at Conservatory Range 2. Fee $25.00.

b—Advanced—For people who have already completed the introductory course or its equivalent. 1:30 P. M. to 4:30 P. M. Wednesday afternoons at Conservatory Range 2. Fee $25.00.

6—Trees and Shrubs.

A popular course, designed to aid in the recognition of our more common trees and shrubs, being a comprehensive survey of the woody plants, native, naturalized, and cultivated, found in the metropolitan area.

a—Conifers. 5 sessions, Saturday, 10 to 12 A. M. December 3 to January 14. Fee $5.00. Credit 10 hours.

b—Willow, Poplar, Sweet Gale, Walnut, Birch, Beech and Oak Families. Saturdays 10 to 12 A. M. September 17 to October 15. Fee $5.00. Credit 10 hours.

bb—Same groups and requirements as (b). Saturdays 10 to 12 A. M. February 25 to March 25.

c—Elm, Hackberry, Mulberry, Magnolia, Barberry, Laurel, Witch-Hazel, Plane Tree, Rose and Pulse Families. Saturdays 10 to 12 A. M. October 22 to November 19. Fee $5.00. Credit 10 hours.

cc—Same groups and requirements as (c). Saturdays 10 to 12 A. M. April 22 to May 20.

d—Rue, Quassia, Cashew, Holly, Staff Tree, Bladdernut, Maple, Soapberry, Buckthorn, Vine, Linden, Ginseng, Dogwood, Heath, Ebony, Storax, Olive, Nightshade, Figwort, Bignonia, Madder, Honeysuckle Families, Saturdays 10 to 12 A. M. January 21 to February 18. Fee $5.00. Credit 10 hours.

dd—Same groups and requirements as (d). Thursday afternoons 4 to 6 P. M. April 27 to May 25.

7—Our Native Ferns and Their Allies.

Outdoor studies at the Botanical Garden. Tuesdays 4 to 6 P. M. June 6, 13, 20. Fee $3.00. Credit 6 hours.

8—Forestry and Forest Trees.

An outdoor introduction to the fundamentals of forestry and the principal local forest trees. 8 sessions, 2½ hours each. Saturday mornings, July 8 to August 26 inclusive, 9:30 to 12. Credit 20 hours. Fee $10.00.

Birds and Their Food Habits, by Miss Helene Lunt.

Outdoor studies on Sunday mornings or another day by arrangement.

a—Fall Migrants September 18 to October 30. Seven sessions, 1½ hours each. Credit 10 hours. Fee $10.00.

b—Early Spring Migration—February 26 to April 9. Seven sessions, 1½ hours each. Credit 10 hours. Fee $10.00.

c—Late Spring Migration—April 16 to May 28. Seven sessions, 1½ hours each. Credit 10 hours. Fee 10.00.

For further information write to Dr. Forman T. McLean, Supervisor of Public Education, The New York Botanical Garden, Bronx Park, New York City.

RYDBERG'S FLORA OF THE PRAIRIES AND PLAINS[1]

The appearance of Dr. Rydberg's latest Flora supplies a long-felt want in the literature on North American systematic botany. At last we have in a single volume an authoritative work on the flora of the great plains area whose fringes only had been touched by previous standard manuals and floras. The various lists and catalogues of species which have been published for some of the states or portions of states have often proved more of an exasperation than a help, and even the local floras, though perhaps admirable for their circumscribed areas, have left altogether too much in limbo as regards both identity and distribution of species.

It is altogether fitting that Dr. Rydberg should have written the Flora of the Prairies and Plains, for without doubt no contemporary botanist had so comprehensive and accurate a knowledge as he of the plants of the vast area stretching all the way from the

[1] Rydberg, P. A. Flora of the Prairies and Plains of Central North America. Pp. i–viii + 1–969. f 1 599. 14 Ap 1932.

Mississippi River to the Rocky Mountains. In the midst of this area he began his botanical career. To it he returned, with unabated interest and zeal, to carry on to the very end and bring forth what in the reviewer's opinion is much the best of his numerous systematic works.

In consecrating his last years to the preparation of the Flora, Dr. Rydberg was unsparing of his energies and declining health. Twice within a period of three years he visited the region for extensive travel and field work, for a study of the plant collections in the principal herbaria of the plains states, and for consultations with the botanists resident in the region. It was my good fortune to accompany him on two of these botanizing trips in Minnesota, the second of which, alas, turned out to be his last direct contact with the plant life of the region and also the last botanical excursion of his active career.

The Flora of the Prairies and Plains is really more than the title implies. It includes a goodly number of species and even genera of the contiguous floral regions which one is not accustomed to regard as properly belonging to the elements of the prairies and the plains. If one should happen to overlook the introduction he would feel that the author has gone out of his way to pad the volume, but such is not the case. Actually the Flora is intended to include, in addition to the plains species of pteridophytes and spermatophytes, all of those known to occur in Iowa, Minnesota, the southern parts of Manitoba and Saskatchewan, as well as most of the species found in the prairie regions of Wisconsin, Illinois, and northeastern Missouri.

From the standpoint of offering a manual of wider usefulness, the inclusion of these species is both justifiable and commendable, but whether its usableness in the plains area has not been considerably impaired thereby may be questioned.

Altogether, 3,988 species are treated in the Flora, and it is gratifying to find that a host of so-called species of doubtful validity have been relegated to a well-deserved synonomy. In this the author has exercised unbiased judgment, for a considerable number of forms so treated are of his own former making.

The task of constructing workable keys to the genera and species has been performed with marked success, and nowhere does the author's wide experience and taxonomic skill stand out

to greater advantage than in this important feature of the work. The descriptions likewise are admirably done. For the most part they are fully adequate for satisfactory diagnosis and identification and yet they are not so long as to consume much-needed space nor so involved as to befuddle the user. Another outstanding feature of the Flora is the six hundred illustrations, depicting a representative species of nearly two thirds of the genera treated. They are of such excellent quality that they are certain to prove an invaluable aid not alone to the amateur but to the professional botanist as well.

In the citation of geographical ranges of species the author has unfortunately perpetuated many errors occurring in earlier published reports, catalogues, and manuals. Thus the state of Minnesota is credited with a considerable number of species which do not come anywhere near its boundaries and which were definitely read out of its flora years ago. In light of the discriminating care with which the rest of the text is prepared, this lapse is both surprising and disappointing and the only explanation that presents itself is that the necessary time was not available for proper verification of the reports. But errors of this sort, though annoying, are not serious and they are not likely to detract materially from the value of the work.

There is one feature of the Flora, however, to which the reviewer feels impelled to register objection and one which in his opinion is distinctly harmful in a work of this kind. This is the policy of splitting genera. The inordinate multiplication of unfamiliar combinations resulting from this practice leaves even the systematist more or less bewildered, and one can readily imagine the state of mind of the ecologist, the plant pathologist, and others who perforce must use the proper appellations for the entities with which they deal.

Taxonomic justice can be served just as well by merely sectioning the old familiar genera, and the sections can be keyed as readily as the smaller genera. This procedure requires no more space—in fact rather less—and the manipulation can be done as effectively in a manual as in monographic work. But upon this question differences of opinion will always obtain and it is futile and out of place to pursue the discussion further here.

If one concedes with Dr. Rydberg that segregation of genera is the better taxonomic practice, and if he further concedes the tenet that every variant with sufficient constant characters to distinguish it from any other merits recognition as a species, he will find in The Flora of the Prairies and Plains a model work in every respect. Even if he is not in full sympathy with these principles he will frankly recognize that it is a work of outstanding merit and a worthy contribution to North American systematic botany.

It is very fortunate that Dr. Rydberg's life was spared until he had time to finish the text for the Flora, and fortunate also that he had such loyal colleagues to carry the work to completion. Especial credit is due Dr. Howe for the labor of love he has performed in seeing the book through the press.

C. O. ROSENDAHL,
University of Minnesota.

NOTES, NEWS, AND COMMENT

On July 27, Dr. A. B. Stout, Director of the Laboratories, gave an illustrated lecture on "Lilies for our Gardens" at Hillcrest Gardens, Weston, Massachusetts.

Just three days before he was lecturing on "Deserts of the Southwest" at The New York Botanical Garden, and showing a picture of the largest individual "Joshua tree" (*Yucca brevifolia*) of the Mojave desert, Dr. Arthur Hollick received by special delivery a letter telling of the vandalistic burning of this tree, evidently by reckless or fire-hungry sightseers. The tree, which was, perhaps, a thousand years old, had long been a landmark of the desert, which is the only place in the world where it grows. This particular specimen was of tremendous size. The letter telling of the tragedy of its burning came from Mrs. A. Sherman Hoyt, one of the southwestern desert's greatest enthusiasts and conservationists, and donor of the magnificent display of cacti in Conservatory Range 1 at The New York Botanical Garden.

During the past month Mr. Egbert H. Walker has been on detail from the United States National Herbarium, Washington,

D. C., engaged in editing the manuscript of a bibliography of eastern Asiatic botany. This is a joint undertaking by Dr. E. D. Merrill and Mr. Walker, which has been in preparation for the last three and a half years, sponsored by The New York Botanical Garden and the Smithsonian Institution. The 13,000 references, gathered from more than 900 periodicals and serials, are being checked so far as possible in the Garden library, to reduce to a minimum the errors which so easily creep into a work of this kind. This undertaking has been greatly benefited by the assistance of temporary employees of the Garden, provided during the past two years by the Emergency Work Bureau.

Doctor W. S. Fisher has recently described, in Proceedings of the United States National Museum, a genus of Porto Rico beetles, under the name *Brittonella.* He remarks: "I take great pleasure in dedicating this genus to Dr. N. L. Britton, eminent botanist, director for more than three decades of The New York Botanical Garden, chairman of the Porto Rico Committee of the New York Academy of Sciences, to whose able and indefatigable services are due in large part the success of the natural history survey of Porto Rico." Only one species is known, *Brittonella Chardoni,* named in honor of Don Carlos E. Chardon, Chancellor of the University of Porto Rico, "in recognition of the encouragement of scientific work he has repeatedly displayed." The type-specimens, collected at Mayagüez, Porto Rico, are preserved in the American Museum of Natural History, New York.

Meteorology for August: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 92° F on the 4th, *94° on the 8th;* 89° on the 15th; and 93° on the 25th. The minimum temperatures recorded were: 63° on the 5th; 60° on the 13th; *59° on the 20th;* 61° on the 24th; and 63° on the 31st. The total precipitation for the month was 2.13 inches.

ACCESSIONS

Additions to the Collection of Dahlias (1932)

41 roots, 22 varieties. (Given by Sunny Slope Dahlia Terraces.)
27 roots, 22 varieties. (By exchange with Twin Oak Dahlia Farm.)
26 roots, 13 varieties; and 2 plants, 2 roots. (Given by Success Dahlia Gardens.)
26 roots, 6 varieties. (By exchange with Mrs. Marie V. Beals.)
21 roots, 11 varieties. (Given by Mr. W. L. W. Darnell.)
17 roots, 17 varieties; and 4 plants, 4 varieties. (Given by Boston Dahlia Gardens.)
17 plants, 12 varieties. (Given by Fisher & Masson.)
16 roots, 12 varieties. (By exchange with Dr. M. A. Howe.)
13 roots, 10 varieties. (By exchange with Mrs. Carl Sherwin.)
13 roots, 5 varieties. (By exchange with W. C. Garwick.)
12 plants, 6 varieties. (Given by Ruschmohr Dahlia Growers.)
10 roots, 10 varieties. (Given by Mr. Herman Rindfleisch.)
10 roots, 5 varieties. (Given by Wakeman Gardens.)
9 roots, 5 varieties. (Given by Mr. Samuel Newson.)
9 roots, 4 varieties. (Given by Mr. Morgan T. Riley.)
17 plants, 12 varieties. (Given by Fisher & Mason.)
8 plants, 5 varieties; and 6 roots, 2 varieties. (Given by Mr. C. Louis Alling.)
8 plants, 4 varieties; and 2 roots, 1 variety. (Given by Dahliadel Nurseries.)
8 roots, 4 varieties. (Given by Mr. F. S. Cackener.)
6 plants, 6 varieties. (Given by Waite's Gardens, Inc.)
6 roots, 6 varieties. (Given by Mr. L. G. Cronberger.)
6 roots, 3 varieties. (Given by Mr. Thomas L. Galvin.)
6 roots, 3 varieties. (Given by Mr. E. L. Kunzman.)
6 roots, 1 variety. (Given by Lyndora Gardens.)
5 clumps, 3 varieties; and 31 roots, 6 varieties. (By exchange with Miss Virginia Stout.)
5 roots, 3 varieties. (Given by White's Dahlia Gardens.)
4 plants, 4 varieties. (Given by Mr. J. A. Kemp.)
4 roots, 2 varieties. (By exchange with Mr. Leo Ritter.)
4 roots, 2 varieties. (Given by Mr. Charles Steele.)
3 roots, 2 varieties. (Given by Dr. Herman Trossbach.)
3 plants, 3 varieties. (Given by Chappaqua Dahlia Gardens.)
3 roots, 3 varieties. (Given by Alice Meussdorffer Dahlia Gardens.)
3 roots, 2 varieties. (Given by Willow Dahlia Gardens.)
2 plants, 2 varieties; and 1 root. (Given by Premier Dahlia Gardens.)
2 plants, 2 varieties. (By exchange with Dr. John H. Cordes.)
2 plants, 1 variety. (Given by Mr. H. R. Chapman.)
2 plants, 1 variety. (By exchange with Mr. E. J. O'Keeffe.)
2 roots, 1 variety. (Given by N. Harold Cottam & Son.)

2 roots, 1 variety. (Given by Mr. J. E. Hulin.)
2 roots, 1 variety. (Given by Mr. Lynn B. Dudley.)
2 roots, 1 variety. (Given by Mr. M. J. Moroney.)
2 roots, 2 varieties. (Given by Mr. T. W. Walker.)
1 clump. (By exchange with Mr. T. Murphy.)
1 clump. (By exchange with Mrs. Elizabeth Pincula.)
1 root. (Given by Stumpp & Walter Co.)
1 root. (By exchange with Mrs. E. Spingler.)
1 root. (By exchange with Mr. Curtis M. Redfern.)
1 root. (Given by Judge J. S. Clark.)
1 root. (Given by Mr. H. Felgner.)
1 root. (Given by Mr. Howard J. Frame.)
1 root. (Given by Mr. Charles Garrity.)
1 root. (Given by Mr. W. H. Kanouse.)

LIBRARY ACCESSIONS, JANUARY 1–MARCH 31, 1932

ABERCROMBIE, JOHN. *The hot-house gardener: on the culture of the pine-apple and methods of forcing early grapes, peaches* [*and*] *nectarines.* London, 1789.

ADAMS, JOHN. *A students' illustrated Irish flora.* Ashford, 1931.

Annales Franco-Chinoises, publiées trimestriellement par l' Institut Franco-chinois de l' Université de Lyon. Année 1–5. 1927–31. (By exchange.)

Annals of philosophy; or, magazine of chemistry, mineralogy, mechanics, natural history, agriculture and the arts. Vols. 1–28. London, 1813–26.

ANON. *System der Garten-Nelke.* Regensburg, 1827.

BARDSWELL, FRANCES ANNE. *The herb garden.* Ed. 2. London, 1930.

BENTHAM, GEORGE. *Handbook of the British flora.* Ed. 7, revised by A. B. Rendle. Ashford, 1930.

BERNHARD-SMITH, A. *Poisonous plants of all countries.* Ed. 2. London, 1923.

BEWS, JOHN WILLIAM. *The world's grasses; their differentiation, distribution, economics and ecology.* London, 1929.

BIGOT DE MOROGUES, PIERRE MARIE SÉBASTIEN. *Essai sur les moyens d' améliorer l' agriculture en France.* 2 vols. Paris, 1822.

BOERHAAVE, HERMANN. *Historia plantarum quae in horto académico Lugduni-Batavorum crescunt.* 2 vols. Londini, 1738.

BONDT, NIKOLAUS. *De cortice Geoffraeae surinamensis.* Lugduni Batavorum, 1788.

BOURNE, RAY. *Regional survey and its relation to stocktaking of the agricultural and forest resources of the British empire.* Oxford, 1931.

BOWER, FREDERICK ORPEN. *Joseph Dalton Hooker.* London, 1919. (Given by Mr. E. L. Core.)

BRIARD, PIERRE ALFRED. *Florule cryptogamique de l' Aube et supplément au catalogue des plantes de ce département.* Troyes, 1888.

BRUCE, C. A. *Report on the manufacture of tea, and on the extent and produce of the tea plantations in Assam.* Calcutta, 1839.

BUTCHER, ROGER WILLIAM. *Further illustrations of British plants. Drawings by Florence E. Strudwick.* Ashford, 1930.

CLEMENTS, FREDERIC EDWARD, & SHEAR, CORNELIUS LOTT *The genera of fungi.* New York, 1931.

CLERCQ, FREDERIK SIGISMUND ALEXANDER DE. *Nieuw plantkundig woordenbock voor Nederlandsch Indie . . . bewerkt en uitgegeven door M. Greshoff.* Amsterdam, 1909.

CORREVON, HENRY. *Les fougères rustiques.* Genève, 1890.

CRONEMEYER, GUSTAV. *Alphabetical catalogue of plants growing in the open air in the garden of Thomas Hanbury . . . Palazzo Orengo, La Mortola, near Ventimiglia, Italy.* Erfurt, 1889.

CROSS, CHARLES FREDERICK, BEVAN, EDWARD JOHN, & BEADLE, CLAYTON. *Cellulose.* London, 1895.

Cyprus agricultural journal. Vols. 16–24. Nicosia, 1921–29.

DALLIMORE, WILLIAM. *Holly, yew & box, with notes on other evergreens.* London, 1908.

DELACROIX, ÉDOUARD GEORGES. *Atlas des conférences de pathologie végétale, professées à l' Institut national agronomique.* Paris, [1902].

DIVERS, W. H. *A catalogue of the trees, shrubs and plants growing in the gardens, woods and pleasure grounds of Belvoir Castle.* Stamford, 1904.

DÖRRIEN, KATHARINA HELENA. *Verzeichniss und Beschreibung der sämtlichen in den Furstlich Oranien-Nassauischen Landen wildwachsenden Gewächse.* Herborn, 1777.

DRUCE, GEORGE CLARIDGE. *The flora of Northamptonshire.* Arbroath, 1930.

DUNN, STEPHEN TROYTE. *Alien flora of Britain.* London, 1905.

ELLIS, WILLIAM. *Three visits to Madagascar during the years 1853–1854–1856.* London, 1858.

ELWES, HENRY JOHN, & HENRY, AUGUSTINE. *The trees of Great Britain and Ireland.* 7 vols. Edinburgh, 1906–13.

FAIRCHILD, DAVID GRANDISON. *Exploring for plants.* New York, 1930. (Given by The Macmillan Co.)

FARRER, REGINALD JOHN. *My rock-garden.* London, 1907.

FELIX, JOHANNES PAUL. *Leitfossilien aus dem Pflanzen- und Tier-reich in systematischer Anordnung.* Ed. 2. Leipzig, 1924.

FISCHER, EDUARD, & GÄUMANN, ERNST ALBERT. *Biologie der pflanzenbewohnenden parasitischen Pilze.* Jena, 1929.

FISHER, ROBERT. *Flowers of grass: how to know the names of the British grasses.* London, 1931.

FORSYTH, WILLIAM. *Observations on the diseases, defects, and injuries in all kinds of fruit and forest trees, with an account of a particular method of cure.* London, 1791.

FRANCÉ, RAOUL HEINRICH. *Die Welt der Pflanze.* Berlin, 1912.

FRANKE VON FRANKENAU, GEORG. *Flora francica rediviva; oder Kräuter-Lexicon . . . vermehret von Johann Gottfried Thilo.* Ed. 4. Leipzig, 1736.

FRITCH, FELIX EUGEN, & SALISBURY, EDWARD JAMES. *Botany for students of medicine and pharmacy.* London, 1921.

FUHRMANN, FRANZ. *Einführung in die Grundlagen der technischen Mykologie.* Ed. 2. Jena, 1926.

GANCEDO, ALEJANDRO. *Flora arbórea del territorio nacional del Chaco y proyecto de Ley.* Buenos Aires, 1916.

Gartenschönheit. Vol. 12. Berlin, 1931. (Given by Mrs. Wheeler H. Peckham.)

GMELIN, JOHANN FRIEDRICH. *Enumeratio stirpium agro tubingensi indigenarum.* Tubingae, [1772].

GODLEWSKI, EMIL. *Oeuvres d' Emile Godlewski père.* Vol. 1. Cracovie, 1930.

GODWIN, HARRY. *Plant biology.* Cambridge, 1930.

GORTER, DAVID DE. *Materies medica.* Amstelodami, 1740.

GOTHAN, WALTHER. *Aus der Vorgeschichte der Pflanzenwelt.* Leipzig, [1912].

GREENISH, HENRY GEORGE, & COLLIN, EUGÈNE. *An anatomical atlas of vegetable powders.* London, 1904.

GREY, ROBERT MELROSE. *Report of the Harvard botanical gardens, Soledad estate, Cienfuegos, Cuba (Atkins foundation) 1900–1926.* Cambridge, 1927.

GROENING, CASPER GABRIEL. *Nomenclator linnaeanus in Elisabeth Blackwell herbarium selectum, emendatum et auctum etc.* Lipsiae, 1794.

GUIBOURT, NICOLAS JEAN BAPTISTE GASTON. *Histoire naturelle des drogues simples.* 4 vols. Paris, 1876.

GUNTHER, ROBERT WILLIAM THEODORE. *Early British botanists and their gardens, based on unpublished writings of Goodyer, Tradescant and others.* Oxford, 1922.

———. *Further correspondence of John Ray.* London, 1928.

Handlist of trees and shrubs, exluding Coniferae, grown in the Royal Botanic Gardens, Kew. Ed. 3. London, 1925.

HARDY, MARCEL E. *The geography of plants.* Oxford, 1920. (Given by Dr. J. H. Barnhart.)

HARTMANN, LEOPOLD VON. *Abhandlung von dem Wachsthume und dem Krankheiten der Pflanzen.* München, 1774.

HAYWARD, CHARLES FRANCIS. *Geometrical flower beds for everybody's garden.* London, n. d.

HAYWARD, W. R. *Botanist's pocket-book.* Ed. 19, revised by G. Claridge Druce. London, 1930.

[HEADLEY, FREDERICK WEBB.] *The fauna and flora of Haileybury.* 2nd issue. Hertford, 1902.

HEHN, VICTOR. *The wanderings of plants and animals from their first home.* Ed. by James Steven Stallybrass. London, 1885.

HENSLOW, GEORGE. *How to study wild flowers.* London, 1902.

———. *The heredity of acquired characters in plants.* London, 1908.

HERLIN, UNO RAFAEL. *Paläontologisk växtgeografiska studier i norra Satakunta.* Helsingfors, 1896.

HOFFMANN, CARL. *Botanischer Bilder-Atlas nach De Candolles' natürlichen Pflanzensystem.* Stuttgart, 1884.

HOLMES, EDWARD MORRELL. *Catalogue of the Hanbury herbarium in the museum of the Pharmaceutical society of Great Britain.* London, 1892.

HOOKER, JOSEPH DALTON. *Lecture on insular floras, delivered before the British association for the advancement of science at Nottingham, August 27, 1866.* [London, 1867.] (Given by Dr. J. H. Barnhart.)

HORT, ARTHUR FENTON. *The unconventional garden.* London, [1930].

HOWARD, ALBERT, & HOWARD, GABRIELLE LOUISE CAROLINE. *Wheat in India: its production, varieties and improvement.* Calcutta, [1909].

HUBBARD, ARTHUR J. *Norman Tower garden, Windsor Castle. Catalogue of plants. June, 1910,* n. p. [1911].

ITO, TAKEO. *Taiwan shobubutsu dzusetsu.*

JAY, MARY RUTHERFORD. *The garden handbook.* New York, 1931.

JENKINS, THOMAS. *Hortus maryboncnsis; or, a catalogue of hardy herbaceous plants, deciduous & evergreen shrubs, forest & fruit trees . . . cultivated at [the] botanic garden and nursery Mary-le-bone square.* London, 1819.

JOHNSON, ARTHUR TYSILIO. *The hardy heaths and some of their allies.* London, 1928.

JOHRENS, MARTIN DANIEL. *Vade mecum botanicum.* Francofurti & Lipsiae, 1717.

JOURDAN, ANTOINE JACQUES LOUIS. *Pharmacopée universelle.* Ed. 2. Paris, 1840.

JUCH, KARL WILHELM. *Abbildung und populäre Beschreibung von acht und vierzig Giftpflanzen.* Augsburg, 1819 [1817–18].

KAMPEN, NICOLAUS VAN, *und Sohn. Abhandlung von Zwiebelgewachsen.* Regensburg, 1764.

KAUFFMAN, C. H. *The dictionary of merchandize, and nomenclature in all European languages . . . containing the history, places of growth, culture, use, and marks of excellency, of such natural productions as form articles of commerce.* Ed. 4. London, 1815.

KERVILLE, HENRI GADEAU DE. *Notes sur les fougères.* Paris, 1923.

KLEIN, JAKOB THEODOR. *An Tithymaloides; frutescens; foliis Nerii Plum. nec Cacalia nec Cacaliastrum.* Gedani, 1730.

KOLBANI, PAUL. *Giftgeschichte des Thier-, Pflanzen- und Mineralreichs, nebst den Gegengiften und Medizinischen Anwendung der Gifte.* Wien, 1798.

KUNTZE, CARL ERNST OTTO. *Phytogeogenesis. Die Vorweltliche Entwickelung der Erdkruste und der Pflanzen in Grundzügen.* Leipzig, 1884.

LACHMANN, HEINRICH WILHELM LUDOLPH. *Flora der Umgegend von Braunschweig.* 2 vols. and Anhang in 3 vols. Braunschweig, 1827–31.

LALONDE, LOUIS MARIE. *Flore-manuel de la Province de Quebec.* Montreal, 1931.

LA QUINTINIE, JEAN DE. *Il giardiniero francese, ovvero trattato del tagliare gl' alberi da frutto con la maniera di ben allevarli, trasportato dal Francese di Monsu René Dahauron.* Venezia, 1723.

La Villa Venosa in Albano Laziale. Bergamo, 1917.

LEE, SARAH (WALLIS) *Trees, plants, and flowers: their beauties, uses, and influences.* London, 1854.

LEGUÉ, ALPHONSE MARIE LÉON. *Catalogue raisonné des Basidiomycètes qui croissent autour de Mondoubleau.* Vendome, 1908.

LÉMERY, NICOLAS. *Dictionaire; ou, traité universel des drogues simples.* Ed. 3. Amsterdam, 1716.

LEYEL, HILDA. *The magic of herbs: a modern book of secrets.* London, 1926.

LIEGEL, GEORG. *Lehrbuch der Pomologie mit neuen Kirschen-Charakteren. Zugleich als pomologisches Wörterbuch zu gebrauchen.* Ed. 2. Regensburg, 1830.

LINDLEY, JOHN, & MOORE, THOMAS. *The treasury of botany.* 2 vols. London, 1874.

———. New and rev. edition, with supplement. 2 vols. London, 1876.

Lindley library: catalogue of books, pamphlets, manuscripts and drawings. London, 1927.

LUNDEGÅRDH, HENRIK GUNNAR. *Environment and plant development, being "Klima und Boden in ihrer Wirkung auf das Pflanzenleben."* Translated and edited by Eric Ashby. London, 1931.

MCALPINE, DANIEL. *The rusts of Australia.* Melbourne, 1906.

MCIVOR, WILLIAM GRAHAM. *Notes on the propagation and cultivation of the medicinal cinchonas or Peruvian bark trees.* Madras, 1867.

MAIJER, L. TH. *De kokospalm of klapperboom.* Batavia, 1917.

MAUBLANC, ANDRÉ. *Les champignons comestibles et vénéneux.* Ed. 2. 2 vols. Paris, 1926–27.

MESCHINELLI, LUIGI, & SQUINABOL, SENOFONTE. *Flora tertiaria italica.* Patavii, 1893.

MEYER, FRANK NICHOLAS. *Chinese plant names.* New York, 1911.

MITCHELL, THOMAS LIVINGSTONE. *Journal of an expedition into the interior of tropical Australia in search of a route from Sydney to the Gulf of Carpentaria.* London, 1848.

MOFFAT, C. B. ED. *Life and writings of Alexander Goodman More with selections from his zoological and botanical writings.* Dublin, 1898.

MORRIS, JOSEPH WILLIAM. *Catalogue of plants in the Broome botanical garden, Royal Victoria Park, Bath.* Bath, 1893.

MORTIMER, JOHN. *The whole art of husbandry; or, the way of managing and improving of land.* 2 vols. London, 1721.

MÜLLER, FERDINAND. *Das grosse illustrierte Kräuterbuch.* Ed. 2. Ulm, 1866.

MÜLLER, HUGO. *Die Pflanzenfaser und ihre Aufbereitung für die Technik.* Braunschweig, 1876.

Mycologisches Centralblatt. Vols. 1–5. Jena, 1912–14.

[NATHUSIUS, HERMANN.] *Verzeichniss der im Freien ausdauernden Bäume und Sträucher, welche in den Plantagen und Gärten zu Althaldensleben und Hundisburg bey Magdeburg kultiviert und um beigesetzte Preise verkauft werden.* Neuhaldensleben, 1828.

Naturhistorisk Tidsskrift. Vol. 1–4; new series, vol. 1, 2. Kjøbenhavn, 1837–49.

New flora and sylva. Vols. 1–3. London, 1929–31.

NEWTON, LILY (BATTEN). *A handbook of the British seaweeds.* London, 1931. (Given by Dr. M. A. Howe.)
NICHOLLS, HENRY ALFRED ALFORD. *A text-book of tropical agriculture.* London, 1906.
NICHOLS, THOMAS. *Observations on the propagation and management of oak trees in general: but more immediately applying to His Majesty's New Forest in Hampshire.* Southampton, 1791.
NOWELL, WILLIAM. *Diseases of crop plants in the Lesser Antilles.* London, n. d.
OEDER, GEORG CHRISTIAN. *Einleitung zu der Kräuterkenntniss.* 2 parts. Kopenhagen, 1764–66.
OGATA, MASASUKE. *Icones filicum Japoniae.* 4 vols. Tokyo, 1928–31.
OKEN, LUDWIG LORENZ. *Allgemeine Naturgeschichte für alle Stände. Botanik.* Vols. 1–2 in 4 vols. Stuttgart, 1839–41.
ONSLOW, MURIEL (WHELDALE). *Practical plant biochemistry.* Cambridge, 1920.
———. Ed. 3. Cambridge, 1929.
OTTO, J. J. *Ganz neue Entdeckung der in Deutschland noch unbekannten wahren, ächten, zahmen Waidtpflanze. Als ein Anhang ist beygefügt: Waidtkunst oder Beschreibung der alten Waidtküpe, wo man ohne Indigo, mit dem Waidt allein blau gefärbet.* Frankfurt am Mayn, 1794.
Oversigt over det kongelige danske videnskabernes Selskabs Forhandlinger. 1917–1930/31. København, 1917–31.
PEARSON, HENRY HAROLD WELCH. *Gnetales.* Cambridge, 1929.
PEREZ, GEORGE VICTOR. *A selection of botanical and other papers.* [London] 1925.
PERKINS, WALTER FRANK. *British and Irish writers on agriculture.* Lymington, 1929.
PHILLIPS, HENRY. *The companion for the orchard.* New ed. London, 1831.
PLANCHON, LOUIS DAVID. *Les champignons comestibles et vénéneux de la région de Montpellier et des Cévennes aux points de vue économique et médical.* Montpellier, 1883.
PRESL, JAN SWATOPLUK. *Počátkowé rostlinosloví, s 32 obrazy.* Praze, 1848.
———. *Třicet a dwa obrazy k prwopočátkům rostlinosloví.* Praze, 1848.
Proceedings of the Birmingham natural history and microscopical society 1869–70. 2 vols. Birmingham, 1870–71.
Proceedings of the Linnean society of London. Vols. 1, 2. London 1839–55. *Proceedings 1855–63.* London, 1856–64.
RAMALEY, FRANCIS. *Colorado plant life.* Boulder, 1927.
REINER, JOSEF, & HOHENWARTH, SIGMUND VON. *Botanische Reisen nach einigen Oberkärntnerischen und benachbarten Alpen.* Ulm, 1793.
RENAULD, FERDINAND. *Aperçu phytostatique sur le département de la Haute-Saône suivi d' un catalogue des plantes vasculaires et des mousses.* Paris, 1873.
RENNIE, JOHN. *School lessons in plant and animal life.* London, 1912.

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NATURAL GRAFTS

Exploration through a score of years in the little-known or botanically unknown parts of peninsular Florida and of the Florida Keys has brought the writer and his associates in field-work face to face with many "freaks of nature," botanical, zoological, and geological.[1]

In the course of our wanderings unusual natural grafts of trees were observed. Some were photographed. These are described and shown by figures on the following pages.

Our subjects represent both conifers and broad-leaved trees. They were all found in the jungles of southern Florida, or in Indian parlance, in hammocks.[2]

The first case here recorded is one in which two cypress trees (*Taxodium ascendens*) had become united, Siamese-twin fashion (see FIGURE 1). Here two branches, one on each tree, were broken or worn off at about the same level. The ends chanced to meet head-on almost perfectly, and ultimately formed a union. This specimen is in a small hammock island in the Everglades a few miles southwest of Royal Palm Hammock in Dade County.

The second case is in Royal Palm Hammock. Here also, two trees were concerned—a pair of pigeon-plums (*Coccolobis lauri folia*). One of two neighboring trees was pushed and held against the trunk of a tree of slightly larger caliber. Whatever agency

[1] These field studies were carried on within the geographical region designated for botanical exploration and interpretation by the Garden management. Most of this field-work was done through the patronage of the late Charles Deering. My principal associates were Charles A. Mosier, chief naturalist, Paul Matthaus, captain of the "Barbee," and John DeWinkeler, driver of the "weed-wagon."

[2] A hammock is an association of broad-leaved trees surrounded by pine-forest or prairie.

FIGURE 1. Two cypress trees (*Taxodium ascendens*) in an Everglade hammock, Dade County, Florida, united by head-on graft of a lateral branch of each trunk.

FIGURE 2. Main stem of a pigeon-plum (*Coccolobis laurifolia*) grafted into the trunk of another pigeon-plum about six feet above the ground.

brought the two tree trunks together evidently held them in position long enough for the other agencies—wind, breezes, or storms—to wear away the bark and hold the wood of each in contact long enough to bring about a union of the tissues. The union here is complete. Scarcely any scar is evident, except on

the side of the main trunk facing the observer. This is caused by the slight non-centering of the ingrowing trunk (see FIGURE 2).

The third case is that of a Spanish stopper (*Eugenia buxifolia*) found in the hammock covering of Pumpkin Key. This stopper is a small tree, about two inches in diameter near the grafted branch, between six and eight feet above ground. Here only one tree is concerned. Some agency both bent a lateral branch and pressed it against the main stem. The branch must have been held securely and tightly, for the section (see right-hand photo in FIGURE 3) shows how deeply the end of the branch grew into the main trunk and how thoroughly the tissues united.

The fourth case is that of a pair of live-oaks (*Quercus virginiana*) at a new street corner in the northern part of Miami. Here four grafts are evident. The great strength of the unions is graphically shown. The neighboring tree concerned was removed in clearing the land. Its grafted branches were chopped off by an axman, mostly on one side, the one nearest the oak which was removed. The axman did well, of course without intent, to show the strength of the unions.

Considering the several grafts: The completeness and firmness of the union of the lower one is truly remarkable, the jarring of the ax in cutting and the weight now all on one arm (to the left) emphasizing the great strength. In addition it is crosswise. The middle graft is that of a secondary trunk of the large neighboring tree.[3] It is cut away about a foot above the ground. Here the union is oblique. The top graft is a double graft, the first one longitudinal, the second one oblique. They are wholly separated as may be seen by the light visible between the unions. (For all the oak grafts see FIGURE 4).

All the detached and grafted branches were living at the time the photographs were made—numerous young shoots being present, except on the second graft.

With the exception of the cypress all the woods concerned are

[3] These secondary trunks are the result of the survival and growth of "suckers" at the base of the stump of the tree cut down. On the site of all old Indian camps where the main trunk was cut away, "suckers" up to eight and ten in number often developed from the old stump as semi-independent trunks. These often ultimately formed independent trees.

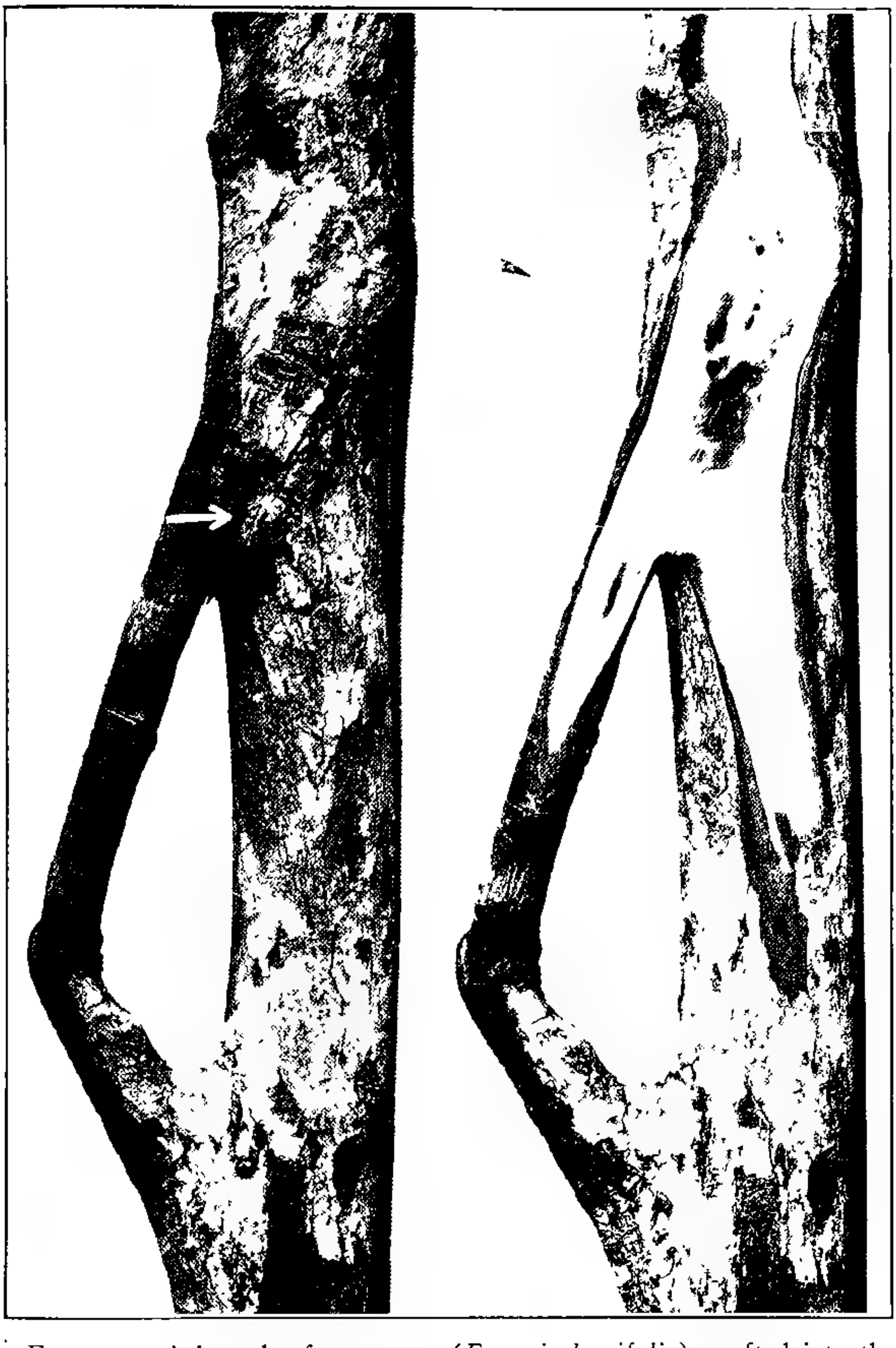

FIGURE 3. A branch of a stopper (*Eugenia buxifolia*) grafted into the main stem of the tree.

FIGURE 4. Three limbs of a live-oak (*Quercus virginiana*) now cut away from their trunk, grafted to the trunk of a neighboring live-oak.

hard and heavy. The following table, in the order of the several specific gravities of perfectly dry woods, from light to heavy reads:

Taxodium ascendens, 0.4543—28.31 pounds per cubic foot.
Eugenia buxifolia, 0.9360—58.33 pounds per cubic foot.
Quercus virginiana, 0.9501—59.21 pounds per cubic foot.
Coccolobis laurifolia, 0.9835—61.29 pounds per cubic foot.

Considering the weight and hardness of the woods concerned, we venture to predict that man would have difficulty in repeating the above described grafts.

JOHN K. SMALL.

TREES AND SHRUBS OF THE ORIENT—I

BARBERRIES

Almost everybody knows the Thunberg Barberry (*Berberis Thunbergii*), which many consider to be "the hedgeplant *par excellence*" for medium-tall hedges. It will stand nearly any amount of clipping, has no disfiguring disease, is absolutely hardy, and will not be injured by the severest drought. The hedge it forms is almost impenetrable; and dogs, which frequently injure most other hedges, stay severely away from a Barberry hedge because of its thorns.

The fall coloring of the leaves, a beautiful scarlet, is also a great asset, though the equally ornamental red berries are largely lost, if the plants are clipped into a formal hedge. If grown as a dense, unpruned thicket, for instance, on steep, sunny banks where little else will succeed, the profusely produced fruit also will come into its own as an ornament as well as bird food, for which it serves until late in the winter.

However, as much as can be said in favor of this Barberry, it seems to me that its planting has been rather overdone. Seeing it everywhere, almost no garden without it, I have come near to hating it. If a thing is too easy, it makes for laziness, and that seems to have been the case here. Because this plant is so good, we need not forget that there are others which are just as good or even better. Do we always have to do exactly as our neighbor does? Why don't we rather say, "Because my neighbor has this, I am going to have something else"? Let our gardens be individual rather than uniform.

Here are some suggestions of worth-while shrubs which will give our gardens individuality and character.

Suppose we do want to plant some Barberry bushes because of their above outlined advantages; then we are by no means confined to the Thunberg Barberry. On the contrary, the species which I am mentioning below are mostly of superior beauty—that is, if they are left unpruned—and they all share the advantages of the Thunberg Barberry. Quite a few of them will make just as good hedges, but for this purpose we may stick to the Thunberg Barberry, since it can be bought more cheaply than any other and since every shrub loses its individuality when trimmed into a hedge.

Berberis Poiretii (commonly known as *B. sinensis*), for instance, which is rather closely related to the Thunberg Barberry and which resembles the latter in foliage and habit, is much more conspicuous in flower. Its flowers are arranged in loose racemes, while those of *B. Thunbergii* are born solitary or in bundles of two to five. Its fruits, which are also bright red, are produced in great profusion—their arrangement in racemes making them very conspicuous—and are retained until late in the winter. Its fall coloring is fully as good as that of the Thunberg Barberry. Like *B. Thunbergii* it will reach eventually a height of about six feet.

Another equally desirable species of the same group is *Berberis Sieboldii.* Its leaves are egg-shaped and quite large, reaching a length of two inches. It has long, stout, three-parted thorns, and bright red, lustrous berries. Its foliage is purplish when young; and colors beautifully to purplish red in the fall. The fruits retain their color and shape until spring. This species is of rather slow growth, and will hardly exceed five feet in height.

The last species of this group which I shall mention here, and which like the others excels in the brilliant fall coloring of the foliage—deep red in this case—and by having bright red, long-retained berries, is *Berberis koreana.* As its name indicates, it is a native of Korea or Chosen. Its leaves are broad, elliptic, almost three inches long, leathery when mature, and spiny-toothed. The shrub is of upright habit, with rather stout branches, and as a specimen shrub or in loose groups is of unsurpassed beauty.

Of smaller stature on the average are the species of the next

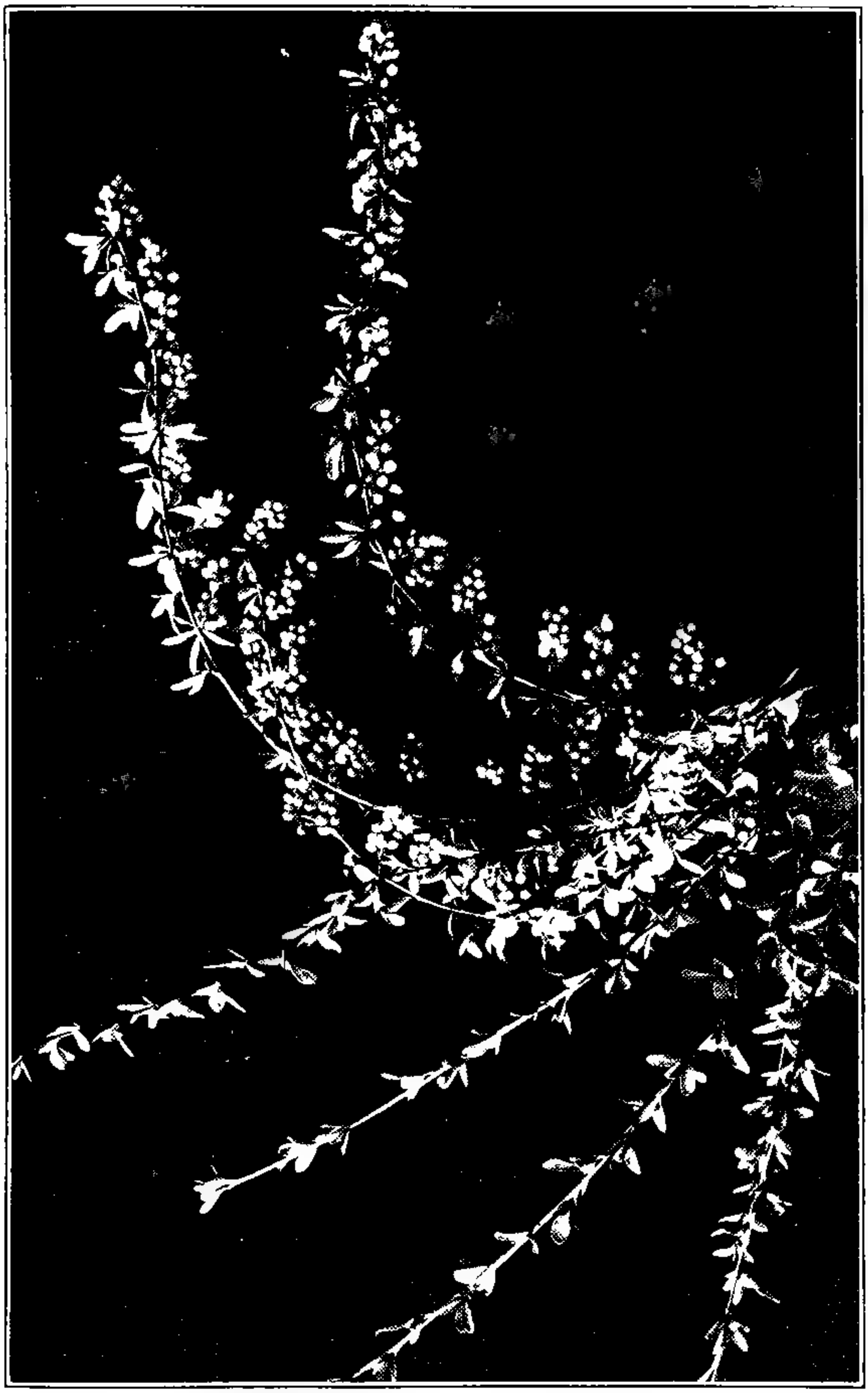

FIGURE 1. *Berberis Poiretii*, in fruit.

group, which contains several particularly desirable varieties. I mention briefly only the following:

Berberis sibirica, a low, spreading, very spiny shrub, which rarely exceeds two feet in height. Its short stout spines are three- to eleven-parted. The rather small spoon-shaped leaves have spreading, spiny teeth. Its fruit is bright red. This species is, undeservedly, quite rare in cultivation.

Berberis concinna and *B. angulosa* hail from the Himalayas. They are, unfortunately, not quite so hardy as the other species mentioned so far, though they have been found to be reliably hardy in the vicinity of New York, if not unduly exposed. The branches of *B. angulosa* are pubescent, while those of *B. concinna* are glabrous; otherwise they are quite similar, though *B. angulosa* grows somewhat more vigorously. Both have roundish leaves, which are bright green above and whitish beneath. Their flowers are usually solitary, but large, bright yellow and very showy. Their fruits are bright red, large and handsome. In height *B. concinna* will reach three feet, and *B. angulosa* eventually will touch five feet.

One of the most striking species of Barberry is *Berberis dictyophylla,* which also belongs to this group. Its branches—especially of its variety *albicaulis*—as well as its leaves, are so glaucous they are almost white. It will give a very pleasing and conspicuous contrast, if this shrub is planted near dark green shrubs, or as background for red or bright blue flowers. The berries of this species are pinkish-red. It will reach a height of five or even six feet, and is of loose, rather stiffly spreading habit. Its native habitat is western China, and it is reliably hardy everywhere.

Also from China and equally hardy is the somewhat similar *Berberis circumserrata.* This species is not quite so white, however, its branches being yellowish-brown; it is of somewhat smaller stature, reaching hardly more than three feet, and is of somewhat more graceful habit. Its leaves have very fine spiny teeth, while those of *B. dictyophylla* are usually entire.

Another dwarf Barberry of outstanding garden merit is *Berberis Wilsonae,* apparently named for the wife of the famous collector and horticulturist, E. H. Wilson, the late keeper of the Arnold Arboretum. Though botanists class it in another group, it is closely akin to the five last-named species, which it resembles

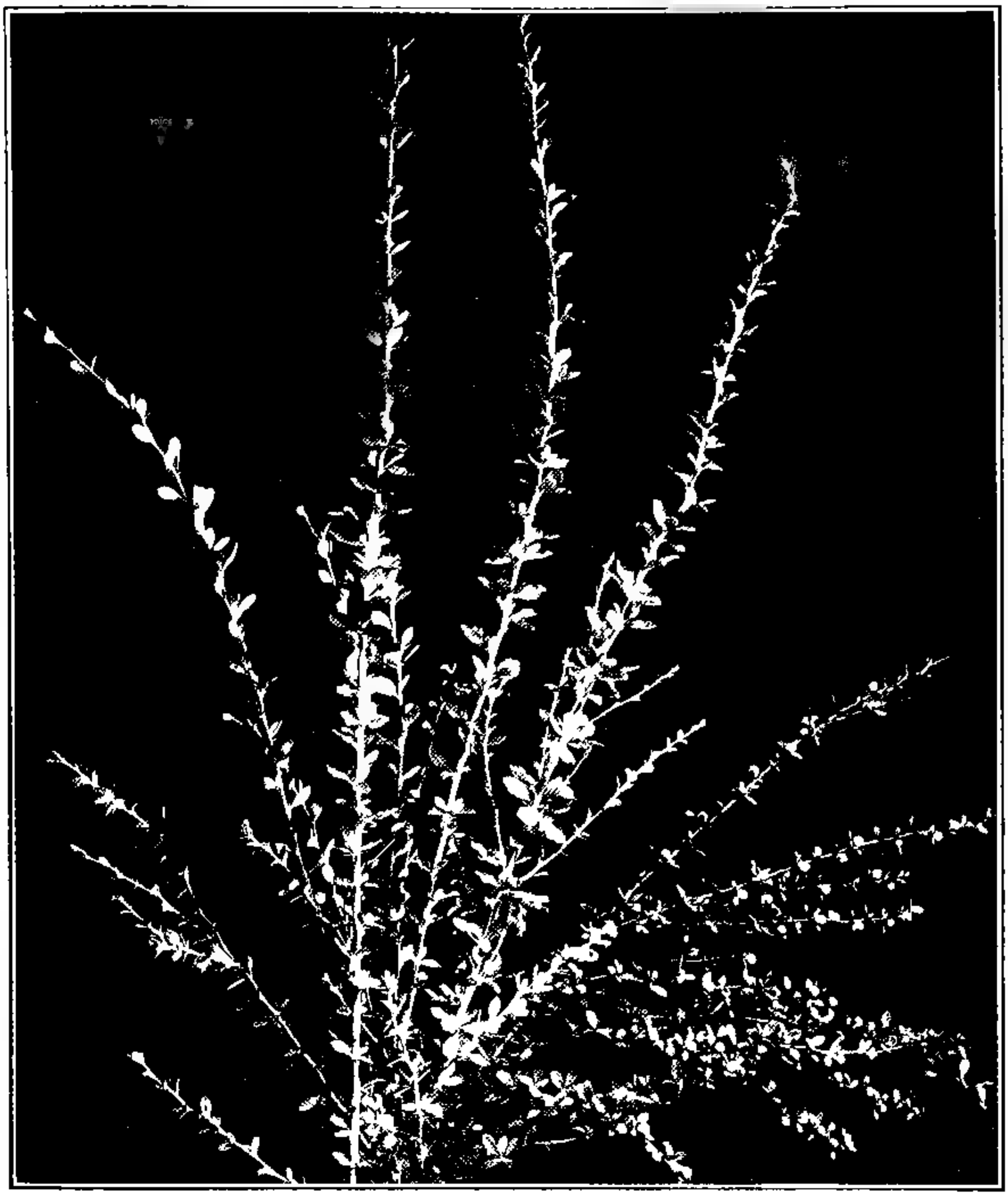

FIGURE 2. *Berberis dictyophylla,* in fruit.

also in its bundled flowers. This species is a graceful, low-spreading shrub, reaching hardly more than three feet in height. Its grayish-green, narrow, rather small leaves, which remain on the branches till late in the year, assume brilliant orange and scarlet tints in the autumn. Its flesh-pink or salmon-red berries, frequently with one pale and one red cheek, are produced in great profusion, and are retained on the branches until late in the winter. For planting on a dry sunny slope it is much superior in ornamental effect to the much taller and coarser Thunberg Barberry.

Its variety *subcaulialata* is of somewhat more vigorous growth, has dark bluish-green leaves, which are whitish beneath, and is somewhat more tender. However, it has proved perfectly hardy in the vicinity of New York.

Two other species, classed in this same group, which, like the last named, hail from western China, and are also well worthy of a place in the garden, are *Berberis aggregata* and *B. polyantha.* Both are of vigorous growth. *B. aggregata* reaches nine feet, while *B. polyantha* will reach even twelve feet in height. Both are very similar in habit and in the shape of their leaves; but *B. polyantha* is distinguished by its much larger, many-branched inflorescence, which forms a loose panicle which the deep golden-yellow flowers render very conspicuous. *B. aggregata* has short, dense panicles of pale yellow flowers—hence the other name, *B. brevipaniculata*, under which it is frequently listed. The berries of *B. aggregata* are dull red and somewhat bloomy, while those of *B. polyantha* are pinkish or salmon-red. The latter is the handsomer one of the two, but *B. aggregata* is somewhat hardier. In the vicinity of New York, however, both have proved perfectly hardy.

The next two species, also of outstanding ornamental value, are of very distinct appearance, and in protected localities they will be found to be half-evergreen. Their names are *Berberis aristata* and *B. Francisci-Ferdinandi.* The latter is a native of Western China; while *B. aristata* comes from the Himalayas. They are quite similar in their stiffly spreading habit, and in the general appearance of their leathery, lustrous, rather large foliage. Either will reach about nine feet in height. The main difference between them is found in their flowers. Those of *B. aristata* are arranged in simple, though many-flowered racemes; while the flowers of *B. Francisci Ferdinandi* are arranged in drooping, many-branched panicles. Both are very beautiful in flower as well as in fruit; though I give preference to *B Francisci-Ferdinandi,* which has bright scarlet berries, while the berries of *B. aristata* are dull red or purplish. Moreover, *B. aristata,* though quite hardy in the vicinity of New York, is decidedly more tender than *B. Francisci-Ferdinandi.*

As much as I wish to limit this account to as few species as possible, I feel that I should not close without mentioning at least

two more Barberries which are particularly handsome. The first of these is *Berberis dasystachya,* which is unique on account of its round, long-stalked, bright green leaves, trembling in every breeze. This is a very vigorous-growing shrub, which will reach as much as twelve feet. It is of graceful habit and its coral-red berries are conspicuous and handsome. The second is *B. Vernae,* from northwestern China, which has already found its way into the nursery trade of this country. Its narrow, longish, rather small leaves on slender, spreading branches render this shrub very

FIGURE 3. *Berberis aggregata,* in fruit.

graceful, and its densely clustered red berries are ornamental in the fall. *B. Vernae* resembles in many ways the above-mentioned *B. Poiretii*, though botanists class the two in different groups. *B. Vernae* has on the average larger spines, those of *B. Poiretii* being very short. The leaves of *B. Poiretii* are usually whitish beneath, while those of *B. Vernae* are green on both sides. The flowers of *B. Vernae* are somewhat smaller, and the racemes in which they are arranged are denser than those of *B. Poiretii*.

Of course, there are many other handsome shrubs among the 175 species of this generally beautiful genus, but those which I have mentioned I consider to be the "cream of the cream." The much recommended and unquestionably very handsome *Berberis japonica*, with its still superior variety *amurensis* (*B. Regeliana*), I have left out on purpose, since it, like the closely related *B. vulgaris* and *B. canadensis*, is more likely than any of the others to serve as host for one of the stages of *Puccinia graminis*, a fungus which causes the much dreaded wheat-rust. Especially in agricultural sections its planting should therefore be discouraged rather than recommended.

The evergreen species of *Berberis*, of which there are several of garden-merit, I expect to treat in a later article.

H. TEUSCHER.

ASIATIC IMMIGRANTS IN THE BOTANICAL GARDEN—I

Early in the development of The New York Botanical Garden many exotic new plants, both herbaceous and woody, were set out as part of the landscape or planted for study. Some were natives of eastern Asia and are hardy in this latitude, where they grow vigorously. During the first quarter of this century several of these Asiatic exotics made themselves at home in the Garden area. Two of these are described in this note and others will be considered in a series of notes in subsequent numbers of this JOURNAL.

In 1897 the Japanese bitter-sweet (*Celastrus articulatus*) was planted in the viticetum east of the Museum Building. It is also native in China. Within a few years large tangled masses of

bitter-sweet appeared on shrubbery and rocks near-by. The casual observer expressed surprise at the abundant growth of the shrubby bitter-sweet in the Garden area, assuming this growth to be the American bitter-sweet, until it was painted for illustration in *Addisonia,*[1] where a note states that it is one of the most vigorous of the woody hardy vines, related to and similar in habit to our native *Celastrus scandens.* It is distinguished from the American plant by having the flower clusters borne in the leaf-axils instead of at the ends of the branchlets. Thus the showy fruits are hidden in the foliage until the leaves fall, when the yellow lining of the capsules and the bright red arils come into full view during the autumn and winter seasons. This color scheme is appreciated by various birds and they are not slow in taking advantage of this food supply and consequently scattering the seeds which start new colonies of the vine where they may rest for a time after feeding. This plant may be propagated by seeds—a method the birds have well illustrated in the Garden,—by wood cuttings, by root cuttings, or layers, or by suckers, which are abundant.

On account of its hardiness and vigorous growth the Japanese bitter-sweet is especially suitable for covering decrepit shrubs or trees, rocks, walls, and barren spots.

In 1900 the Thurber's magnolia (*Magnolia Kobus*) was introduced in the plantations of the Garden. This tree, from the forests of Japan, was introduced into horticulture in the United States by Thomas Hogg, one of the original members of the Torrey Botanical Club, the organization which was instrumental in bringing about the establishment of The New York Botanical Garden in Bronx Park.

This plant has long been a favorite in cultivation, both for its early blooming and symmetry of growth. It has also been a favorite for illustration. After the tree was established in the Garden it was painted and an illustration of it was published in *Addisonia.*[2]

The flowers of this magnolia appear before the leaves. The corolla is white, but sometimes flushed with rose at the center. The fruit has more color than the flowers. It is an irregular,

[1] Addisonia **4**: 9. *pl. 125.* 1919.
[2] Addisonia **3**: 55. *pl. 108.* 1918.

usually curved, red "cone." From the several swellings which open at maturity red or orange fleshy-coated seeds are suspended. These are much sought after by birds, and by their agency they are sown in various, sometimes unsuspected, places.

A few years ago visitors walking through the hemlock grove along the Bronx River observed a shrub they could not place with any native shrub of their acquaintance. The dense shade of the hemlocks retarded the plant's vigor, and flowers were evidently slow in appearing on the branches. The leaves and their odor were the only characters by which its identity might be determined. Through these, however, its place in the plant scale was soon located, and then the reason for its spontaneous growth in the Hemlock Grove was evident. The attractively colored seeds had led the birds to break the regulation that no plant is to be introduced into the Hemlock Grove of the Garden without due authority.

JOHN K. SMALL.

A GLANCE AT CURRENT LITERATURE[1]

Three distinctive American shrubs described by J. Horace McFarland in the British publication, *The New Flora and Silva,* for July are *Hydrangea arborescens grandiflora, Hydrangea quercifolia,* and *Gordonia Alatamaha.* The first is the native hydrangea with broad cymes, (not the one with pointed panicles), which has been found wild from New Jersey westward to Iowa and southward to Florida and Missouri. The oak-leaved hydrangea is mentioned because of its deep-crimson foliage in autumn and its flowers tinged with pinkish-purple—a shrub which is beautiful at every season. It grows wild in southern United States. The Gordonia, an especially handsome plant, with large white flowers appearing in September, was discovered by John Bartram in Georgia, but it is now seldom found except in gardens. Many other interesting plants for this country and Great Britain are also described in this issue.

[1] All publications mentioned here—and many others—may be found in the Library of The New York Botanical Garden in the Museum Building.

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How to make old-fashioned bubble bouquets is told in the June number of the Missouri Botanical Garden *Bulletin*. In the same issue is a brief illustrated article on the dangers of V-forking in trees.

* * * * *

"Garden Tools That I Have Tested" by Donald Lindsay in *Horticulture* for July 1 gives the home gardener a pageful of practical information.

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In the column entitled "Orchid Notes and Gleanings" in *The Gardeners' Chronicle* for July 2 there is a remarkable picture of *Zygopetalum Crawshayanum*. The two series, "Garden Pests: Their Detection and Control" and "Mr. F. Kingdon Ward's Eleventh Asiatic Expedition," are still continuing. In the issue of July 9 appears an interesting article headed "Leaf Colour in Spring."

* * * * *

Cultural notes on cacti for the Atlantic Coast are an important feature of the July *Cactus and Succulent Journal* by Leon Croizat. The author points out the necessity of giving plants conditions of water, soil, and temperature as nearly as possible like those of their native habitat.

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Chinese peonies and tree peonies in Japan are both discussed in the *American Peony Society Bulletin* for June. The former article speaks of named varieties dating as far back as the third century. Another feature deals with the peony in Japanese life today.

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The *National Horticultural Magazine* for July contains fifteen portraits of forms and species of *Calochortus* by L. A. Guernsey; also an article on Campanulas for the rock garden by Robert M. Senior, illustrated with portraits by Maltby. "The A.B.C.'s of Rock Gardening" is an exhaustive presentation of the subject by Alice Miner, beginning in July and to be continued. Ivy, phlox, crocuses, and *Lonicera* are among other plants treated in this issue.

A. C. Smith of The New York Botanical Garden is the author of a monograph of more than 500 pages on "The American Species of Thibaudeae" recently published as a Contribution from the United States National Herbarium. The Thibaudeae are a tribe of the Vacciniaceae, the Blueberry Family, almost wholly confined to the New World tropics, where, in the higher Andes, they are an outstanding feature of the vegetation. The fruit is not widely eaten, but many of the plants are of great beauty, and some of them are cultivated in Europe. Mr. Smith, with E. P. Killip, collected many of the plants treated in the monograph.

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Contemporary trends and future design in landscape architecture are considered from the point of view of the "modern" and "modernistic" in the July number of *Landscape Architecture*. As usual, this quarterly publication is beautifully illustrated.

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"Some Rich Relations and Country Cousins" by Charles Gibbs Adams in *House and Garden* for August gives a delightfully amusing picture of the close relationships between some of our most prized garden plants and other familiar but very common species.

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The plates alone, which give the effect of slow motion pictures of the opening and closing of flowers, might attract the casual reader to the newest volume issued by the Carnegie Institution of Washington, if the reader gets beyond the title—"Anthokinetics."

G. W. Goldsmith and A. L. Hafenrichter are the authors of this work, which deals with the physiology and ecology of floral movements. Toward the end of their 192 pages of reading matter they discuss the field behavior of the flowers studied, laboratory experiments with them, relation of temperature to their movements, effects of light and humidity, and the mechanism involved.

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A brief note in *Tropical Agriculture* for August describes *bagasse,* the waste from sugar-cane after the sugar has been extracted, as a new source of rayon. The process has been developed to a point where commercial interests need only to work out the practical problems of manufacture.

"Some Fine Points in Delphinium Culture" are given in *New Jersey Gardens* for August by Neal R. van Loon, who, it has been said, "grows the finest delphiniums . . in this country or England." The article provokes discussion and the editor invites it—over his points of using heavy clay soil and providing no lime.

* * * * *

Tropical water-lilies can sometimes be propagated from vegetative growths on the leaves, says Eileen Neuhauser in *Horticulture* for August 1–15. A plantlet sometimes forms on top of the lily pad at the point where the blade and petiole meet. It may be removed and planted as soon as it is large enough to form its own roots.

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Blühende Kakteen und andere Sukkulenten Pflanzen offers variety of family in mappe 9, just issued. Besides pictures of *Echinocactus sanguiniflorus* and *Mammillaria Baumii,* it presents *Stapelia Asterias,* var. *lucida,* belonging to the Milkweed family, and *Sarcocaulon rigidum,* of the Geranium family

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Among the illustrations in the *Addisonia,* issued in June, is Creole Phlox (*Amsonia ludoviciana*), a pale-blue phlox-like flower with star-shaped corolla, belonging to the Dogbane Family. It was first found in Mississippi by Dr. J. R. Ingalls a century ago, but the specimen lay in the Columbia University herbarium for seventy-five years without a name. There it was rediscovered and given its present name in 1903 by Miss Vail. The plant was found growing in Mississippi a few years ago by Dr. John K. Small while making iris studies in the South.

* * * * *

Though primarily a book on insect life, which is a specialty of the author, "A Naturalist in the Guiana Forest" by Major R. W. G. Hingston, contains some interesting chapters on the forest itself, much of which was studied from chairs erected in the tree-tops and reached by long rope ladders. The chief danger, says the author, was that ants were inclined to nibble at the ropes.

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Those interested in medicinal plants will find an abundance of readable material in *Bulletin 31 of the Lloyd Library of Botany,*

Pharmacy, and Materia Medica, in Cincinnati, lately reproduced from a publication of 1886–7. This issue contains complete descriptions and explanations of the uses, past and present, of the tulip tree, lobelia, figwort, blue cohosh, and other plants.

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"Rockeries" is the title of an illustrated eight-page leaflet recently issued by the United States Department of Agriculture.

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Hidden in the back of the *Gardeners' Chronicle of America* for August is a brief but noteworthy article on the making of a bog garden, by Rev. J. F. Anderson. A bog garden comes between the levels of the rock and water gardens, and good drainage is as important here as in other gardens. Some of the choicest of the alpine plants thrive in this situation, says the author, who gives a list of those most suitable.

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Length of day is an important factor in the blossoming of plants, writes A. A. Allard in *Ecology* for July. Plants accustomed to blossoming at a certain season in a certain climate, unless of a universal type that will flower under almost any conditions, will fail to produce even buds if the hours of daylight are reduced or lengthened. For instance, golden-glow, in tests, produced only leaf-rosettes under the influence of ten to twelve-hour days, but produced tall stems and flowers with days of fourteen hours and more. On the other hand, corn from tropical Africa produced inflorescences when grown during ten-hour days, but showed no signs of flowering with a thirteen-hour day. Poinsettias also blossomed with twelve hours of daylight daily, but not with thirteen hours.

"A proper recognition of the length-of-day requirements of plants makes possible a clearer interpretation of many aspects of their behavior and natural distribution than we have had before," concludes the author. "In our artificial introductions, this factor must be taken into account, especially when flowering and fruiting appear to be disturbed."

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Roses are given the most complete treatment seen in a long time in the July 15th *Rivista Italiana delle Essenze, dei Profumi, e*

delle Piante Officinali, a magazine which seems to have no equivalent in the English language. Roses are first described in their mythological and early historical connections, with several famous paintings reproduced. It is told how the ancient Romans grew roses in the winter-time with a circulation of hot water. Early Christian legends and symbolism involving roses are revealed, and the story of the annual rose festivals in France during the sixth century is told. Pictures are shown of alabaster bottles for rose perfume and other decorated jars for the essence of the flowers used in early times. *Rosa canina,* the type species, says this article, was given its name because juice expressed from the petals was formerly used as a remedy for dog-bites. Formulas for the ancient uses of parts of the rose plant in medicine are given; also ancient and modern formulas for perfumes, cosmetics, liqueurs, wines, and sweets. The various products of the rose—dried buds, petals, and fruit, and distilled essence—as well as synthetic and artificial preparations, are all given their place in this treatment. Several pages and many photographs are also devoted to the cultivation of the rose.

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

Dr. R. R. Stewart, for twenty years Professor of Biology in Gordon College, Rawalpindi, India, has brought a large general collection of plants from the northwest Himalaya and the Punjab and expects to spend the year in naming them. During May and June, he was at the Royal Botanic Gardens at Kew, engaged in the study of his ferns and grasses. Professor Stewart has spent most of his summer vacations collecting in Kashmir.

The following visiting botanists registered in the library during the summer: Dr. Edgar Anderson and Mr. Alfred Rehder, Arnold Arboretum, Mass.; Dr. George Hume Smith, New Haven, Conn.; Prof. L. H. Bailey, Itahaca, N. Y.; Dr. Clement G. Bowers, Maine, N. Y.; Dr. Mildred E. Mathias, Pittsburgh, Pa.; Prof. F. A. Varrelman, Mr. Egbert H. Walker and Mrs. R. Kent Beattie, Washington, D. C.; Dr. Roland M. Harper, University, Ala.; Prof. Aaron J. Sharp, Knoxville, Tenn.; Dr. Winona H.

Welch, Greencastle, Ind.; Prof. L. E. Longley, St. Paul, Minn.; Miss M. Rae Johns, Davenport, Ia.; Miss Ida E. Iverson, Grinnell, Ia.; Dr. R. E. Woodson, Jr., and Mr. Julian A. Steyermark, St. Louis, Mo.; Dr. John Wynn Gillespie, Tempe, Ariz.; Dr. H. S. Jackson, Toronto, Can.; Dr. S. C. Harland, Trinidad, B. W. I.; Dr. F. P. Mehrlich, Honolulu, Hawaii; Mr. C. J. Humphrey, Manila, P. I.; Dr. F. E. Fritsch, London, Eng.; Prof. A. C. Seward, Cambridge, Eng.; Dr. R. Vandendries, Brussels, Belgium; Dr. W. Kupper, Munich, Germany; Dr. Ojvind Winge, Copenhagen, Denmark; Dr. Maria Skalińska, Warsaw, Poland; and Dr. Paul P. Stănescu, Bucharest, Roumania.

Press dispatches announce that Dr. George J. Ryan, President of the Board of Education of the City of New York, has received the rank of hereditary Marquis from Pope Pius XI. Among the numerous distinctions previously bestowed upon Dr. Ryan are those of Chevalier of the Legion of Honor of France, officer of the Order of the Crown of Italy, and Chevalier of the Order of the Crown of Belgium. Dr. Ryan is *ex officio* one of the Scientific Directors of The New York Botanical Garden and a member of its Board of Managers.

ACCESSIONS

LIBRARY ACCESSIONS, JANUARY 1–MARCH 31, 1932
(CONTINUED)

Report and transactions of the Birmingham natural history and microscopical society, 1880–83. 4 vols. Birmingham, 1881–84.

Report of proceedings of the central indigenous drugs committee. Vol. 1. Calcutta, 1901.

Reports on the Paris universal exhibition. Part 3. London, 1856.

Revue de botanique appliquée et d' agriculture coloniale. Vols. 1–10. Paris, 1921–30.

RODWAY, JAMES. *In the Guiana forest.* Ed. 3. London, 1897.

RÖSSIG, CARL GOTTLOB. *Die Nelken nach ihren Arten.* 3 parts. Leipzig, [1806–08].

ROHDE, ELEANOUR SINCLAIR. *The scented garden.* London, [1931])

ROHR, JULIUS BERNHARD VON. *Phytotheologia.* Franckfurt, 1740.

SALISBURY, WILLIAM. *Hortus paddingtoncnsis; or, a catalogue of plants cultivated in the garden of J. Symmons, Paddington-House.* London, 1797.

SCHARFF, BENJAMIN. *Juniperi descriptio curiosa.* Francofurti, 1679.
SCHRANK, FRANZ VON PAULA VON. *Baiersche Reise.* München, 1786.
SESTINI, DOMENICO. *Briefe aus Sicilien und der Türkey an seine Freunde in Toscana.* 2 vols. Leipzig, 1780–81.
SEWARD, ALBERT CHARLES. *Plant life through the ages.* Cambridge, 1931.
SHANTZ, HOMER LEROY, & MARBUT, CURTIS FLETCHER. *The vegetation and soils of Africa.* New York, 1923.
SHREVE, FOREST. *The cactus and its home.* Baltimore, 1931.
SICARD, GUILLAUME. *Histoire naturelle des champignons comestibles et vénéneux.* Paris, 1883.
SILVEIRA, ALVARO ASTOLPHO DA. *Floralia montium: Eriocaulaceae.* Bello Horizonte, 1928.
Sitzungsberichte der königl. böhmischen Gesellschaft der Wissenschaften in Prag. 13 vols. Prag, 1882, 1894–98, 1906–12.
SMEE, ALFRED. *A brief sketch of the best varieties of fruits cultivated in England.* Florence, 1876.
Sociedade Broteriana. Boletim annual. Vols. 1–3. Coimbra, 1883–85.
SORAUER, PAUL. *Handbuch der Pflanzenkrankheiten.* Vol. 5, pt. 2. Ed. 4. Edited by L. Reh. Berlin, 1932.
SPONECK, CARL FRIEDRICH VON. *Ueber den Schwarzwald.* Heidelberg, 1817.
STEBBING, EDWARD PERCY. *The forests of India.* Vol. 2, London, 1923.
STEVENSON, J. B. *The species of Rhododendron.* Edinburgh, 1931.
STISSER, JOHANN ANDRESS. *Botanica curiosa; oder nützliche Anmerckungen wie einige frembde Krauter und Blumen in seinem anno 1692 zu Helmstedt angelegten Medicinischen Garten bisshero cultiviret und fortgebracht Johann Andress Stisser.* Helmstedt, 1697.
STOKES, JONATHAN. *A botanical materia medica, consisting of the generic and specific characters of the plants used in medicine and diet.* 4 vols. London, 1812.
TAVERNIER, JEAN BAPTISTE. *Les six voyages de Jean Baptiste Tavernier, Ecuyer, Baron d'Aubonne. en Turquie, en Perse, et aux Indes.* 2 vols. Paris, 1672. (Given by Mr. Clarence Lewis.)
TAYLOR, GEORGE CROSBIE, & KNIGHT, FRANCIS PHILIP. *The propagation of hardy trees and shrubs.* London, 1927.
TEIXEIRO DA FONSECA, ENRICO. *Indicador de madeiras e plantas uteis do Brasil.* Rio de Janeiro, 1922.
TENORE, MICHELE. *Memoria sul Pruno Cocumiglia di Calabria.* Napoli, 1828.
THICKNESSE, RALPH. *A treatise on foreign vegetables . . . chiefly taken from the Materia medica of Steph. Fran. Geoffroy.* London, 1749.
THONNER, FRANZ. *The flowering plants of Africa.* London, 1915.
THORNBER, JOHN JAMES, & BONKER, FRANCES. *The fantastic clan. The cactus family.* New York, 1932. (Given by The Macmillan Co.)
THURSTON, EDGAR. *British & foreign trees and shrubs in Cornwall.* Cambridge, 1930.
TREVOR-BATTYE, AUBYN. *Camping in Crete.* London, 1913.

TRIMEN, HENRY *A handbook to the flora of Ceylon. Part 6. Supplement, by A. H. G. Alston.* London, 1931.

TWINING, ELIZABETH. *Short lectures on plants for schools and adult classes.* London, 1858.

VAILLANT, SÉBASTIAN. *Botanicon parisiense.* Lugduni Batavorum, 1732. (Given by Dr. J. H. Barnhart.)

VALENTINI, CHRISTOPH BERNHARD. *Tournefortius contractus, sub forma tabularum sistens Institutiones rei herbariae.* Francofurti ad Moenum, 1715.

VATER, ABRAHAM. *Supplementum catalogi plantarum sistens accessiones novas quibus hortus academicus wittembergensis hucusque auctus est.* Wittembergae, 1724.

VINCENS, FRANÇOIS. *Recherches organogéniques sur quelques Hypocréales.* Lons-le-Saunier, 1917.

VUILLEMIN, JEAN PAUL. *Les anomalies végétales; leur cause biologique.* Paris, 1926.

WALTHER, AUGUSTIN FRIEDRICH. *De Silphio in veterum nummis ac diversis plantae speciebus.* [Lipsiae, 1746.]

[WALTHER, FRIEDRICH WILHELM]. *Bayern's Land und Natur.* München, 1833.

WATT, GEORGE. *Economic products of India exhibited in the economic court, Calcutta international exhibition, 1883–84.* 2 vols. Calcutta, 1883.

WEBEL, A. *A German English technical and scientific dictionary.* London, 1930.

WELLING, CHRISTOPH FRIEDRICH VON. *Allgemeine historisch-physiologische Naturgeschichte der Gewächse.* Gotha, 1791.

WESTERMAIER, MAXIMILIAN. *A compendium of general botany.* Translated by Albert Schneider. New York, 1896.

WHEELER, JAMES. *The modern Druid, containing instructions for the better culture of young oaks.* London, 1747.

WHITEHEAD, CHARLES. *Profitable fruit farming.* London, 1884.

WIGHT, ROBERT. *Extract notes on American cotton agriculture, as practised on the government cotton farms in Coimbatore.* n. p. 1843.

WILDING, EUSTACE HENRY. *Rhododendrons: their names and addresses.* London, 1923.

WILLIAMS, BENJAMIN SAMUEL. *Hints on the cultivation of British and exotic ferns and lycopodiums.* London, 1852.

WILSON, ERNEST HENRY. *If I were to make a garden.* Boston, 1931.

WINTON, ANDREW LINCOLN, & WINTON, KATE GRACE (BARBER). *The structure and composition of foods.* Vol. 1, 1932. (Given by the authors.)

WRIGHT, WALTER PAGE. *The perfect garden: how to keep it beautiful and fruitful.* London, 1908.

YAMAKAWA. *Kozan shakubutsu.*

ZIMMER, GEORGE FREDERICK. *A popular dictionary of botanical names and terms.* Ed. 2. London, n. d.

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Vol. II. The Influence of Light and Darkness upon Growth and Development, by D. T. MacDougal. xvi + 320 pp., with 176 figures. 1903.

Vol. III. Studies of Cretaceous Coniferous Remains from Kreischerville, New York, by A. Hollick and E. C. Jeffrey. xiii + 138 pp., with 29 plates. 1909.

Vol. IV. Effects of the Rays of Radium on Plants, by Charles Stuart Gager. viii + 478 pp., with 73 figures and 14 plates. 1908.

Vol. V. Flora of the Vicinity of New York: A Contribution to Plant Geography, by Norman Taylor. vi + 683 pp., with 9 plates. 1915.

Vol. VI. Papers presented at the Celebration of the Twentieth Anniversary of The New York Botanical Garden. viii + 594 pp., with 43 plates and many text figures. 1916.

Vol. VII. Includes New Myxophyceae from Porto Rico, by N. L. Gardner; The Flower Behavior of Avocados, by A. B. Stout; Descriptions of New Genera and Species of Plants Collected on the Mulford Biological Exploration of the Amazon Valley, 1921–1922, by H. H. Rusby; and The Flora of the Saint Eugene Silts, Kootenay Valley, British Columbia, by Arthur Hollick. viii + 464 pp., with 47 plates, 10 charts, and 11 text-figures. 1927.

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THE NEW YORK BOTANICAL GARDEN

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Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

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An herbarium, comprising more than one million specimens of American and foreign species.

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Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestal subjects.

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CAROL H. WOODWARD

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GARDEN COÖPERATES WITH G. PROCTOR COOPER, 3RD, SAILING THIS MONTH ON CARIBBEAN SURVEY

G. Proctor Cooper, 3rd, formerly on the staff of the Yale School of Forestry, and at present associated with The New York Botanical Garden as collaborator, left New York the first week in November for the West Indies and the Caribbean coast of South America to continue his botanical and forestry studies.

The expedition has been organized jointly by Mr. and Mrs. Cooper and they will use their schooner yacht "White Cloud" as their base of operations during the entire eight months in the field.

The personnel of the party, besides Mr. and Mrs. Cooper, consists of Mr. William C. Shepard, of New Haven, a retired forester from Cornell and Yale; Mr. Charles Edward Hill, of Brookline, Mass.; Mr. T. Windsor Ford, of Cleveland Heights, Ohio; and Mr. Norman E. Hawes, recent Yale Forestry School graduate, who will collect insects and spiders for museum and study purposes.

The island of Dominica of the British Leeward group has been chosen as the first region for intensive study, because of the dense virgin forest areas covering most of this small but mountainous island. The hot mineral springs at various parts of the interior will be visited and the flora in the immediate vicinity compared with that on other parts of the island to determine what effect, if any, the warm waters have on the types of vegetation. The floras of various elevations, from sea level to the mountain peaks at 4,500 feet, will be compared and, if possible, the transition zones will be noted so as to determine those species which are adapted

to all elevations and those which are confined to any one particular level or site class.

The floras of the islands of Martinique and Guadeloupe will be carefully studied for comparative purposes. Various small islands in the vicinity and throughout the Leeward group will also be visited for observation.

The next region for intensive operation will probably be British Guiana. The schooner will be left at Georgetown and Mr. Cooper and Mr. Shepard will proceed inland, probably under the direction of the British forestry officers. An attempt will be made to reach the hills in the interior.

The next stop on the itinerary is the Lake Maricaibo region where a complete collection of the woods and plants will be made. These are of particular interest to Professor Samuel J. Record, of the Yale School of Forestry, who will compare the complete wood collection from the region with the woods from other coastal lands. It is highly probable that many unusual specimens will be found.

After finishing the survey in Venezuela, the party will sail to the region near Anachucuna Bay on the Colombia-Panama border and will attempt to reach the Caledonian Pass leading to the Pacific Ocean. The ship will proceed up the Caribbean to the Canal Zone to await the party.

The homeward journey will include brief stops at many points along the Central American coast and the ship is expected to reach New York after next July.

The botanical collection made will be shipped from time to time to The New York Botanical Garden for identification, and the Garden will undertake to distribute the duplicate sets to various museums and botanical and educational institutions as a part of its coöperative work with Mr. Cooper. Mr. Cooper has previously prosecuted successful exploring expeditions in both tropical America and tropical Africa.

ELMER D. MERRILL.

TREES AND SHRUBS OF THE ORIENT -II.

Evergreen Barberries

The evergreen Barberries which this article proposes to treat have to be considered apart from the deciduous species, mainly because of their different cultural requirements. To understand these requirements we might call to our minds the conditions under which these shrubs grow naturally.

The regions of China from which they come, at least the species which will concern us in this article, are favored by a climate which is quite different from ours. The winters there are rather cold, to be sure, but through all of their duration, which is for at least five months, the plants are buried in snow. The ground is frozen, of course, and the roots are forced to inactivity; but the snow blanket prevents not only undue evaporation, but also violent changes of temperature. In the spring follows a period of abundant moisture supplied by the melting snow, then a rather hot but humid summer, and then again, with the first frost, plenty of snow.

It is evident that the conditions which our climate has to offer differ considerably from these. Our summers and frequently also spring and fall are rather dry. The winter brings little snow and frequent changes of temperature. Dry winds, which we get in the winter as well as in the summer, are our most serious disadvantage.

Fortunately, at least some of the most ornamental of the evergreen Barberries are quite tolerant—much more so than most of the evergreen Rhododendrons, which inhabit the higher altitudes of the same regions—and they do not demand the deep snow covering which our climate fails to supply. However, it is well when planting them to remember the above-outlined conditions under which these plants live in their native haunts, and under which they thrive most luxuriantly. Even though we can hardly hope to imitate these climatic conditions, we can modify our own sufficiently to assure success by considering the following rules:

1. Make sure that your evergreen plants do not go into the winter dry, which means: soak them thoroughly in the fall before the ground freezes.

2. Apply a mulch of leaves or salt hay to the ground around the plants immediately after the first hard frost, to keep the moisture in the ground and to prevent sudden changes of temperature of the soil.

3. Protect all broad-leaved evergreens against burning by the winter sun, which would at least disfigure them for several months and might even cripple them permanently. This burning occurs most frequently on clear winter mornings after a snow fall on the previous day. The partly melted snow, turned to ice during the night, still clings to the leaves, and the sun burns through it as through a magnifying glass. A similar injury to evergreens may result from too sudden thawing of frozen leaves. Therefore, do not plant evergreen Barberries or other broad-leaved evergreens in eastern or southern exposure. Northwest is the most favorable aspect.

4. Always select a somewhat sheltered spot, which, in particular, offers protection against dry winds, for the planting of evergreen Barberries. Evergreen Barberries will stand some overhead shade, if this shade is not too dense, and if the trees which offer it are deep-rooting species -like, for instance, most of the oaks—so that root competition will not lead to a starving of the shrubs. Indirect shade from a hill, a large boulder, neighboring shrubs or trees, or a wall is preferable, however.

There are seven or eight evergreen or half-evergreen species of *Berberis*, which are native to South America—Chile in particular—and which are occasionally cultivated; like, for instance, the delicately graceful *Berberis Darwinii* and its more robust, hardier hybrid, *B. stenophylla*. These, however, do not concern us in this article as it treats only of the Asiatic species. Some twenty evergreen species native to China and the Himalayas have found their way into cultivation. Of these I select the following five, all native to western or central China, as the most ornamental, most easily cultivated and hardiest kinds.

Berberis verruculosa, forming a dense bush of rather picturesque outline, as the accompanying illustration shows, will reach hardly more than three feet in height. Its hard, roundish, spiny-toothed leaves, which are shiny dark-green above and whitish-glaucous beneath, render this shrub very ornamental; and its rather large, golden yellow flowers add considerably to its

FIGURE 1. *Berberis verruculosa,* a low shrub of rather picturesque form, bearing large golden-yellow flowers.

beauty. This species well deserves the increasing popularity which it enjoys and is worthy of a place in every garden which can offer suitable conditions.

Berberis Julianae, which also has found its way into the nursery trade, and is planted more and more frequently, is of much more vigorous growth, and will easily get twice as tall as the aforementioned *B. verruculosa.* Its leaves, also, which are narrow-elliptic, are much larger and as much as six centimeters long. They are dull dark-green above, and paler beneath. This shrub is of rather upright habit, and resembles in a remote way a small-leaved holly.

Nurserymen, unfortunately, propagate this shrub frequently by grafting it on *B. Thunbergii.* This not only has a stunting effect on the plant, which will never grow as tall and vigorous as a seedling or a cutting, but the very annoying habit of the stock to sucker continuously is as detrimental to the health of the scion as to the looks of the plant. If the grafting has to be resorted to, a stock must always be selected which grows as vigorously as the scion, except where stunting is actually wanted, as in the case of some fruit-trees. Barberries should never be grafted, since

they all grow readily from seeds or cuttings, as I shall outline below.

Berberis Sargentiana is closely related to *B. Julianae,* which it resembles so much in habit and general appearance that it almost takes a botanist to tell the two apart. The distinguishing characters are that the branchlets are reddish while young and rounded with *B. Sargentiana;* while they are yellowish when young and slightly angled with *B. Julianae.* The leaves of *B. Sargentiana* are net-veined, with the veins slightly raised on the undersurface of the leaves; while the veins of the leaves of *B. Julianae* are quite indistinguishable. The fruits, bluish-black and bloomy with both species, are slightly smaller with *B. Sargentiana.* The ornamental value of both species is the same; and, though *B. Julianae* may be slightly hardier north, both do equally well in the vicinity of New York.

Berberis Gagnepainii reminds one very much of *B. verruculosa* in its general appearance. Its leaves, also, are spiny-toothed with somewhat undulate margin, but they are greenish beneath, not white, and are not quite so lustrous above; in outline they are long-elliptic or lanceolate, not roundish. In habit, *B. Gagnepainii* is more upright and more graceful than *B. verruculosa* and is, also, of more vigorous growth, reaching almost six feet in height. It is considered to be somewhat more tender than *B. verruculosa* but has proved perfectly hardy in the vicinity of New York.

Berberis triacanthophora is mentioned last, because it is the rarest in cultivation. Why this is so, is hard to understand, since it is probably the hardiest of all, and is at least as beautiful as any of the others. It is of very graceful spreading habit, and is in height about midway between *B. verruculosa* and the others which I have mentioned, reaching about four or five feet. From its most similar relatives, *B. verruculosa* and *B. Gagnepainii,* it is distinguished by its reddish, later red-brown, smooth branches. The branches of the other two are yellowish-gray and warty. Its leaves are narrow-lanceolate, still narrower than those of *Berberis Gagnepainii,* and are glaucous beneath like those of *B. verruculosa.* The teeth of its leaves are small and inconspicuous, while those of the leaves of *B. verruculosa* and *B. Gagnepainii* are large and spiny. Its flowers are whitish, tinged red, not bright yellow as with the others.

There is a very handsome hybrid between *Berberis verruculosa* and *B. Gagnepainii*, which was first recognized in France, and which was named *B. Chenaultii*, in honor of the well-known French nurseryman L. Chenault, in the nursery of whom it occurred. In this country the same hybrid appeared at the estate of A. G. Hodenpyl, Long Island. It was observed there in a batch of seedlings raised from seed of *B. Gagnepainii*, and was identified by the Arnold Arboretum. Thanks to the generosity of Mr. Hodenpyl, *B. Chenaultii* is now represented also at The

FIGURE 2. Four specimens of *Berberis Julianae* and its progeny, showing the effect of different methods of growth. The dwarfed plant in front was grafted on *B. Thunbergii;* that in the center-background is a seedling, while the two plants on the sides are hybrids of *B. Julianae* with another species.

New York Botanical Garden. It seems to have inherited the best of the characters of both parents. It is of low, spreading habit like *B. verruculosa*, but with the gracefulness of *B. Gagnepainii*. Its leaves are intermediate in both shape and size. They are lustrous dark-green in the summer, and assume beautiful dark

red hues in the autumn. On the whole this hybrid seems to be a very valuable accession to our list of hardy evergreen Barberries, and is well worthy of the attention of garden enthusiasts.

This account may be closed with a few words on the propagation of Barberries.

All the species of *Berberis* grow very readily and easily from seeds, which, as far as health and vigor of the plants is concerned, is by far the best method of propagation. However, one has to consider that most of the Barberries hybridize very easily, and

FIGURE 3. *Berberis Gagnepainii*, another evergreen Barberry, resembles *B. verruculosa* but grows about twice as tall.

that seeds gathered from bushes growing in close proximity to other species are more than likely to give a mixed hybrid offspring. A great many hybrid forms of Barberries of uncertain parentage have originated in this manner and may be found in gardens. Some of these hybrids are extremely beautiful and very fructiferous, and an increasing number of them are offered for sale under horticultural names, especially in English catalogs. Such hybrids should, of course, not be propagated from seeds, since they could

not be expected to come true. They have to be raised from cuttings, and that is a safe and satisfactory method of propagation also in all cases where cross-fertilization is feared because of the nearness of other species. The evergreen species usually grow well from August cuttings made of half ripe wood and kept in the greenhouse over winter, or from layers. The deciduous species grow best from greenwood cuttings taken about the middle of July, or also from layers.

The undesirable stunting effect of grafting, mentioned above, is brought out very well by FIGURE 2. In the foreground may be seen a plant of *Berberis Julianae*, grafted on *B. Thunbergii*. Right behind it, the tallest plant is a seedling of *B. Julianae* which is of the same age as the grafted plant. Notice its fine upright habit and its vigorous growth, as compared with the stunted, grafted plant. On the sides, in the background, are two hybrid plants which were raised from seeds of *B. Julianae*. The other parent of this hybrid is unknown, but the appearance of the plants suggests rather strongly *B. Gagnepainii*.

H. TEUSCHER.

AN UNUSUAL FUNGUS GROWTH

During the summer of 1932, Dr. N. L. Britton directed the writer's attention to a peculiar fungus growth in an iris bed in the garden of Mrs. Henry B. Heylman, at Pelham Manor, New York. The growth seemed so unusual that a special trip was made to Pelham Manor in order to examine and study it.

FIGURE 1. A specimen of *Polyporus frondosus,* which grew from a log 18 inches underground, buried 12 years ago.

The fungus proved to be *Polyporus frondosus,* or a very closely related form. Since this species usually occurs on wood we naturally expected to find it growing from a submerged stump. When the specimen was removed, however, there was no trace of any wood substratum. On the other hand, while it entirely surrounded the plants of Siberian iris, it did not appear to be growing from them. The only other conclusion was that it had grown on the humus present in the soil.

On conferring with the superintendent of the estate we learned that twelve years before a huge log which was too large to be

easily removed had been buried in the garden. Following this suggestion, we dug a hole underneath the fungus growth and finally located the log eighteen inches below the surface of the soil. The fungus evidently had developed from the mycelium which had grown from this log through the soil, finally producing the fruiting bodies above the surface of the ground.

One interesting item in connection with this fungus is the fact that the log was there twelve years before this growth became apparent, although the mycelium must have been growing there throughout the entire period. Another interesting observation was that the above-ground fungus growth, which reached a diameter of three feet, was all formed within a period of about two weeks. The photograph of a portion of this growth, shown in the accompanying plate, scarcely does justice to the fungus, since it is partially obscured by the dense growth of iris. The fungus belongs to the edible group—that is, it is edible if collected while sufficiently young and tender.

FRED J. SEAVER.

DESERTS OF THE SOUTHWEST[1]

What and why is a desert? The term "desert" has been somewhat loosely applied to almost any region or relatively extensive area of the earth's surface that does not normally or naturally produce sufficient vegetation to support a human population. The Century Encyclopedia defines it as "a region of considerable extent which is almost if not quite destitute of vegetation, and hence uninhabited, chiefly on account of an insufficient supply of rain." No such regions and few such areas, however, are absolutely devoid of vegetation; and in connection with them may be found more or less sparse but permanently established characteristic floras and faunas, adapted to their respective environments.

From the view-point of geology and physiography deserts in general may be grouped under two main classes: *cold* (often wet or moist) and *hot* (commonly dry or arid). In each class there is a paucity of vegetation. In cold deserts this is due to low temperature, such as obtains in the barren lands and tundras of

[1] Abstract of an illustrated lecture given at The New York Botanical Garden on Saturday afternoon, July 30, 1932.

the arctic regions. In hot deserts it is due to high temperature combined with deficiency of rainfall regions where evaporation is in excess of precipitation of moisture. Certain of the latter kind only are the subject of today's lecture.

During the period from the end of March to the early part of May of this year it was my good fortune to be in Pasadena, and from there as headquarters I was enabled, through the cordial coöperation and generous assistance of Mrs. A. Sherman Hoyt,[1] to make trips by automobile into the Colorado Desert from San Gorgonio Pass to as far south as Salton Sea, and through the Antelope Valley section of the Mojave Desert, entering through Cajon Pass and leaving by way of Tehachapi.

The part of the Colorado Desert that lies in southern California is in the form of a funnel-shaped basin, relatively narrow at the northern end, where it is known as Coachella Valley, widening southward into the Imperial Valley, and descending from 2,550 feet above sea-level, at the summit of San Gorgonio Pass, to about 250 feet below in the sink of Salton Sea—an almost uniform drop of approximately 37.5 feet per mile.

Incidentally, the recent history of Salton Sea is interesting. The Colorado River, from a short distance above Yuma to its mouth at the head of the Gulf of California, runs through a channel the banks of which are elevated above the adjacent flood plain. During freshets it occasionally overflows. In 1904 the flood waters took possession of an irrigation canal in the vicinity of Yuma and, abandoning its original channel, the river utilized the canal as having the most available gradient, followed it, and overflowed into Salton sink. It was not until 1907 that the break in the river bank was successfully repaired and the river was again restricted to its old channel. The flood water that was impounded in the sink remained and formed what we now call Salton Sea. The water has decreased considerably, but its surficial area is still about 400 square miles. It may also be pertinent here to remark that this general region, in the vicinity of Yuma and Salton Sea,

[1] It is to Mrs. Hoyt that The New York Botanical Garden is indebted for the desert landscape group installed in House No. 6, Conservatory Range No. 1. It is also my pleasure to announce that due to the courtesy of Mrs. Hoyt, a number of colored lantern slide views of desert scenery are available for today's lecture.

is said to be the hottest part of the United States. Recorded temperatures range as high as 120°–130° Fahrenheit in the shade.

The region in the vicinity of Palm Springs and Indio, on the west side of Coachella Valley, possesses many features of botanical interest. The outstanding natural feature is represented by an oasis of fan palms (*Washingtonia robusta*), which are native there; and one for which cultivation is responsible is represented by the plantations of date palms (*Phoenix dactylifera*). In a tract about ten miles north of Palm Springs lies "Devil's Garden" —a typical shrub-cactus tract—although it has been despoiled of many of its cacti by amateur collectors and for commercial purposes. Among the most conspicuous of the shrubs may be mentioned the "Ocotillo" or "Candlewood" (*Fouquieria splendens*), "Smoke Tree" (*Dalea spinosa*)—so named by reason of its resemblance, at a distance, to a cloud of smoke, due to the gray color and fine ramifications of its ultimate branches and twigs, and "Desert Holly" (*Atriplex hymenelytra*), which is, however, more especially characteristic of the region in the vicinity of Salton Sea.

The Mojave Desert is in the nature of an elevated plateau, about 2,000 feet above sea-level. At the time of my visit the ground was carpeted with a profusion of flowering herbaceous plants, of every hue of the rainbow, among which may be specially mentioned the "Sand Verbena" (*Abronia villosa*), "Indian (or "Devil's") Paint Brush" (*Castilleia latifolia*), "Thistle Sage" (*Salvia carduacea*), "Evening Primrose" (*Oenothera trichocalyx*), "Wild (or "Squaw") Cabbage" (*Caulanthus crassicaulis*), and *Coreopsis* sp. (*C. Bigelovii?*). The cacti have been largely exterminated everywhere within easy collecting distance of the highways, but many specimens of an *Opuntia* (*O. Treleasei?*) may be seen in the vicinity of Tehachapi.

The one remarkable feature, however, which never fails to attract attention, is represented by the scattered individuals and small groups of "Joshua Trees" (*Yucca brevifolia*). These are fantastic and grotesque in their manner of branching as they develop, reminding one of pictures by Doré. The ages of certain individual trees have been estimated at approximately 600–800 years. The age of the largest one known, located about

eighteen miles east of Lancaster, in Antelope Valley, was estimated at 1,000 years or more. It was eighty feet in height and nine feet in circumference. Three days ago I received from Mrs. Hoyt, by air mail, special delivery, in order that it might be here in time for today's lecture, a newspaper clipping of an illustrated article relating to this particular tree. An excerpt from the article is as follows:

"Mrs. Sherman Hoyt, President of the International Desert Conservation League, has announced that a $100 reward will be paid by the League for the arrest and conviction of the persons who wantonly burned the giant Joshua tree on the desert near Lancaster two weeks ago. Something of the enormous size of the tree is gained by the fact that the trunk was still burning when a photographer representing the League visited the scene a week after it was set on fire. * * * The deserts of this section are among the few places in the world in which the Joshua trees grow. * * * Nobody paid much attention to the Joshuas until lately * * * As soon as they began to realize their beauty and unique character, there began a wholesale foray into the desert to dig them up * * *. At the present rate of destruction the cactus of the desert and the Joshua tree will be gone within two years."

All honor and success to Mrs. Hoyt, and those associated with her, in their efforts to save what yet remains of our unique desert flora, by having certain desert areas made government reservations, within which the plants may be properly protected and given opportunity to increase and reëstablish their depleted numbers.

The lecture was illustrated by about sixty lantern slides that included topographic and road maps of the regions described, characteristic scenery in the deserts and adjacent coastal plain and mountains, and pictures of the special botanical and geological features mentioned and described.

ARTHUR HOLLICK.

THE NEW YORK BOTANICAL GARDEN SCHOOL FOR GARDENERS

The desirability of establishing in the United States a training center for professional gardeners comparable in its scope to those maintained at Kew and Edinburgh in Great Britain, but adapted to meet the peculiar requirements of this country, has been increasingly recognized of late years. Early in 1930 Mr. Clarence Lewis directed the attention of the National Association of Gardeners to the matter and about the same time Mrs. Mortimer Fox broached this same subject before the Horticultural Society of New York. Both of these organizations undertook a certain amount of preliminary investigation and a committee appointed by the National Association of Gardeners presented a report recommending that any such school should be undertaken in connection with an established institution, preferably a botanical garden.

Here the matter rested until August of the present year, when the Director in-Chief of The New York Botanical Garden instructed me to report to him on the possibilities of establishing a course of instruction for a certain number of the gardeners employed at the Botanical Garden. From this beginning has developed a scheme now in active operation.

Several of the younger members of the Garden staff have been placed on a student-gardener basis. Student-gardeners will be temporary employees remaining in the employ of the Botanical Garden for a period of two years, during which time they will be given every opportunity to obtain a thorough training in horticulture and allied subjects. During the daytime they will perform the duties incident to the position of gardener and as opportunity permits they will be moved from one department to another in order to broaden their experience.

In addition to this practical work, men occupying student gardener positions will be required to attend a course of evening lectures covering two winters' work and including classes in General Botany, Systematic Botany, Physics and Chemistry, Soils and Fertilizers, Plant Pathology, Entomology, and Genetics and Plant Breeding. It is also intended to organize demonstrations by staff members among the living and museum collections, and expedi-

tions from time to time to other gardens, while opportunity will also be afforded student-gardeners to attend certain flower shows and the monthly meetings of the Horticultural Society of New York.

Upon the satisfactory completion of the two-years' course a certificate will be awarded and a year's extension of employment at the Botanical Garden will be granted, during which time the student-gardener is expected to seek outside employment, and to this end the Botanical Garden will coöperate so far as possible, but in all cases the student-gardener must vacate his position at the end of the extension period.

As vacancies occur, new student-gardeners will be appointed. Appropriate requirements for entrance have yet to be formulated and will be published in due course, but emphasis will be placed on the practical training previously acquired.

In the past the gardening profession in the United States has been almost entirely recruited from European countries. In the future, there will be fewer trained men coming from this source and this will mean an increasing demand for American gardeners. The scheme outlined above follows the lines of those in vogue at Kew and Edinburgh to the extent that the entering student-gardeners will be already familiar with the routine of garden practice and the period spent at the Botanical Garden may be regarded as an advanced training to broaden their knowledge and fit them for positions of greater responsibility rather than as an elementary gardening course.

As vacancies in the student-gardener body will necessarily be limited, applications from men prepared to accept appointment without remuneration will be entertained, and two such have already been received.

This change to student-gardener status on the part of these younger gardening employees has been most cordially received, and in addition to the prescribed training they are organizing among themselves a debating society and are planning other activities.

The following are now designated as student-gardeners: T. Anderson, John G. Borin, J. Cahill, Albert Gebert, Denis Grogan, P J. McKenna, Stanley D. Pearson, and Walter Wolney.

T. H. Everett.

NEW SCIENCE COURSE OPENED FOR PROFESSIONAL GARDENERS

On the evening of October 10, The New York Botanical Garden initiated a course of science-training for professional gardeners at the offices of the Horticultural Society of New York in New York City.

This is being started in coöperation with the Horticultural Society of New York and the National Association of Gardeners. Mr. Richardson Wright, Secretary of the Horticultural Society, spoke on behalf of the Society and commended the undertaking. E. D. Merrill, Director-in-Chief of the Botanical Garden, acted as spokesman and welcomed the assembled group of gardeners, and Mr. Donald Crighton, representing the National Association of Gardeners, also spoke.

Mr. T. H. Everett, the Horticulturist at the Botanical Garden, through whose efforts the interest of the professional gardeners was enlisted in the project, told about similar training offered at Kew, where he himself was trained, and at other European botanic gardens. He explained the scope of the work, and the character of records the gardeners would find it well to make during the course. Dr. Merrill then introduced the man in charge of the first class in Systematic Botany, Dr. H. A. Gleason.

Dr. Gleason first explained the scope of his subject, including the classification and naming of plants. He also told about the grouping of plants of essentially similar kind under one name, about the advantages of the scientific Latin names, and about the make-up and significance of the binomial names used and about the name of the author usually given after the plant name. After the talk, several of the gardeners raised pertinent questions about the subject.

The enrollment is of a representative group, numbering 58. Because of the facilities available and the nature of the instruction, the number to be admitted, including employees of the Garden, was set at a tentative maximum of about 50. Several amateurs and others engaged in industries allied to gardening, who applied for admission, could not be accommodated because of the limitations on the course.

The scope of the work contemplated is as follows:

First Year:— Systematic Botany, 12 lectures.
Plant Morphology, 12 lectures.
Physics and Chemistry, 12 lectures.
Plant Physiology, 12 lectures.

Second Year: Soils and Nutrition, 12 lectures.
Entomology, 12 lectures.
Plant Pathology, 12 lectures.
Plant Breeding, 12 lectures.

Since all who are admitted to the course must have at least four years of practical gardening experience as a background, the training is devoted entirely to the study of the basic sciences underlying gardening practices. Examples for illustration will be drawn from types familiar to gardeners, and technical language will be avoided except where necessary or particularly desirable for future guidance in reading and reference work. Thus Dr. Gleason drew upon common horticultural forms as illustrations for his first talk, plants which needed no introduction to his audience of experienced gardeners.

In a similar way, Dr. F. T. McLean introduced the subject of Plant Morphology on Thursday evening, October 13, by first explaining the scope and character of the subject, the subdivisions of the science of botany, and the diversity of plant forms. Some of the odd lower forms were shown, such as *Pleurococcus*, *Oscillatoria*, *Spirogyra*, and *Nitella* among the algae, to illustrate the development of more complex plant forms from single-celled beginnings, but the gardeners were assured that the remainder of this course and the succeeding one on Physiology would deal primarily with flowering plants, which are the principal forms of interest in horticulture. The enrollment in this course, which totaled 48, was not the same as that of the first course, several enrolling for only one of the classes during this first half-year.

The attendance at the course is drawn from widely scattered parts of the metropolitan area, and shows better than any words of commendation could do, how thoroughly the best men in the gardening profession are getting back of the undertaking. The following are enrolled in one or more of the classes:

William Ellis, White Plains, New York; James Esson, Mrs. Eldridge Estate, Great Neck, L. I., William Urban, New Canaan, Conn.; Kenneth Hadland, A. Ludlow Cramer Estate, Westbury, L. I.; Christine R. Vaile, Sterlington, N. Y.; Edwin Beckett, Purchase, N. Y; Fred W. Weidt, Mt.

Kisco, N. Y.; Herbert H. Handleman, White Plains, N. Y.; Theodore Sinzinger, Greenwich, Conn.; J. Harry Logan, Yonkers, N. Y.; S. Woodland, F. Cutting Estate, Glen Head, L. I.; G. P. A. Mayer, Westbury, L. I.; Clyde Nellis, Brooklyn, N. Y.; Anthony J. Pietruszkiewicz, Grand View-on-Hudson, N. Y.; Stanley F. Bulpitt, Darien, Conn.; Tom J. Bulpitt, Portchester, N. Y.; W. Everett, H. E. Manville Estate, Pleasantville, N. Y.; James Jacks, Jr., Mt. Kisco, N. Y.; Frank Lewis, Scarsdale, N. Y.; Paul Staples, Basking Ridge, N. J.; Robert Scott, Mrs. Burden Estate, Mt. Kisco, N. Y.; George Bishop, 2346 Webster Avenue, N. Y. C.; Karl L. Koesis, 5 Convent Hill, West 130 Street, N. Y. C.; William Mills, William Robert Bacon Estate, Westbury, L. I.; Alexander Michie, Havemeyer Estate, Glen Head, L. I.; Fred W. Sparks, A. Bayard Cutting Estate, Oakdale, L. I.; William Whitton, New Rochelle, N. Y.; Charles Munkens, H. E. Manville Estate, Pleasantville, N. Y.; James Falloon, Eldridge Estate, Great Neck, L. I.; Thomas Grieve, Eldridge Estate, Great Neck, L. I.; Oliver Wilson, Oyster Bay, L. I.; Harry Kirkham, Schiff Estate, Oyster Bay, L. I.; Thomas Smith, Schiff Estate, Oyster Bay, L. I.; Alfred W. Van Etten, Schiff Estate, Oyster Bay, L. I.; William Black, Oyster Bay, L. I.; Robert Larson, West Orange, N. J.; William Creeth, Harrison, N. Y.; William Masson, Mamaroneck, N. Y.; James Lough, Scarsdale, N. Y.; James Stuart, Constable Estate, Mamaroneck, N. Y.; Donald Crighton, Convent, N. J.; James Sheldon, Convent, N. J.; Francis Alley, Maplewood, N. J.; Thomas W. Little, Cos Cob, Conn.; Ernest Bardtke, Cos Cob, Conn.; Herbert Woodger, Portchester, N. Y.; Robert R. Gibson, Bedford Hills, N. Y.; George Hewitt, Greenwich, Conn.; Alex. G. Clarkson, Greenwich, Conn.; Charles Steele, Greenwich, Conn.; J. R. Barranger, Greenwich, Conn.; W. J. Ing, Roslyn, L. I.; William Mackie, Carl Weber Estate, Mt. Kisco, N. Y.; Duncan Mackintosh, New Rochelle, N. Y.; P. Kettles, Greenwich, Conn.; John Galletly, Smithtown Branch, L. I.; J. Cahill, Denis Grogan, Albert Gebert, T. Andersen, Walter Wolney, P. J. McKenna, John G. Borin, Clemence Vande Wynckel, S. Pfander, Stanley D. Pearson, of The New York Botanical Garden; Hugo Carlson, Bedford Hills, N. Y.; G. Agate, Great Neck, L. I.; Christ Mogenson, Greenwich, Conn.; Ivar Ivarson, Bedford Hills, N. Y.; Norbert R. Pendergast, Tenafly, N. J.; W. H. Lingard, H. E. Manville Estate, Pleasantville, N. Y.

This professional gardeners' course was started primarily to provide training in science for the student-gardeners at The New York Botanical Garden. The demand for this course by the more active gardeners on near-by private estates was so great that it has been opened to them to make it of the greatest possible usefulness. This association of our student-gardeners with more mature men of the profession will also be of greatest benefit to them.

FORMAN T. MCLEAN.

THE THOMPSON MEMORIAL ROCK GARDEN

Ground was broken for the construction of the new Thompson Memorial Rock Garden during the latter part of September; now (less than a month later) it is a pleasure to report excellent progress.

The new rock garden has been named for Dr. W. Gilman Thompson, who was President of the Board of Managers of The New York Botanical Garden from 1913 to 1922.

The site occupies the north end of "The Glade" (the part of it formerly occupied by the Economic Garden) and includes an

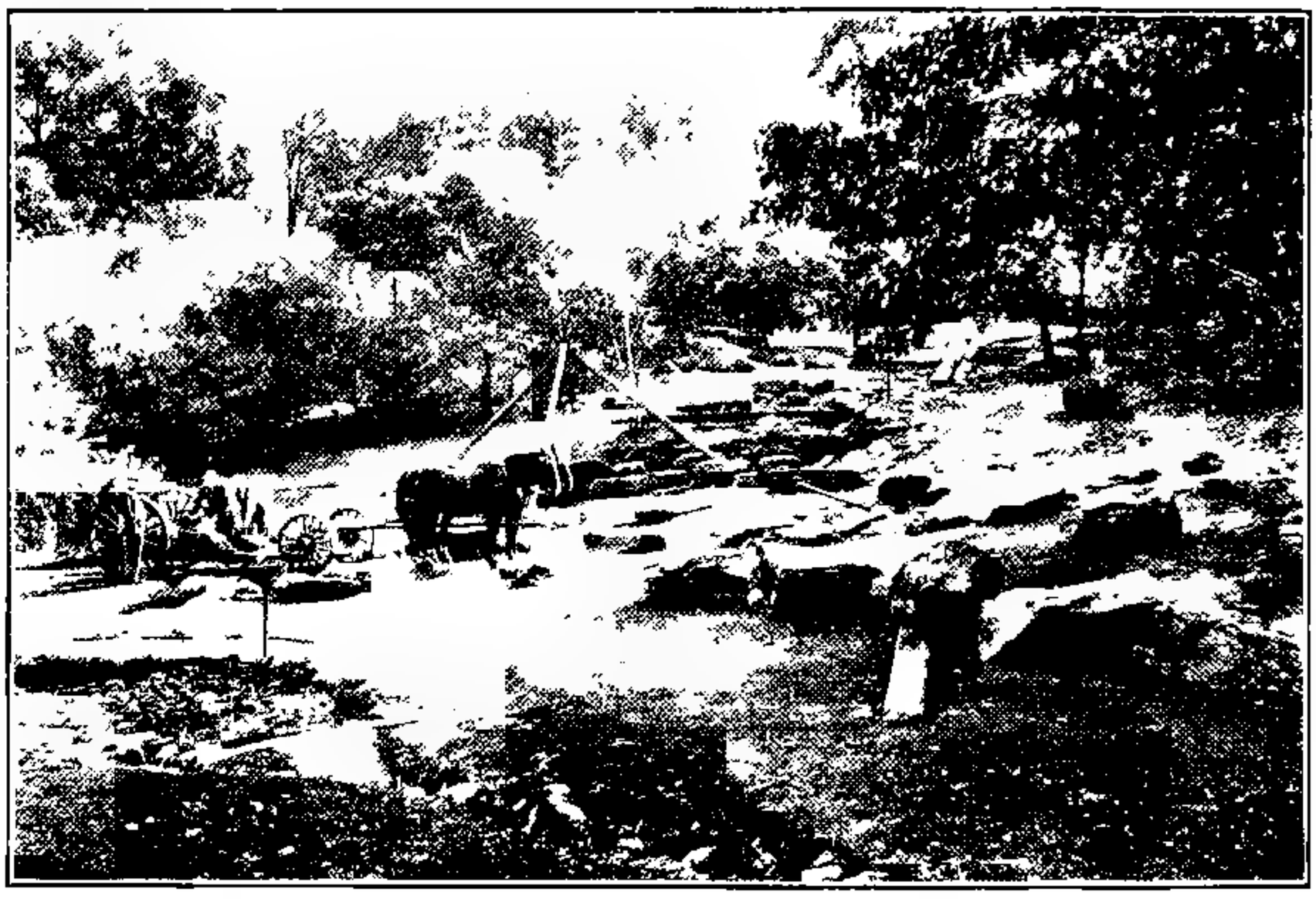

FIGURE 1. An early stage in the construction of the new Thompson Memorial Rock Garden.

open area of slightly more than one and one quarter acres. This location is ideal for the purpose, and possesses the immense advantages of having a beautiful natural setting with a splendid background of forest, and a stream wandering down the glade. It is conveniently located to the Administration Building and Conservatory Range No. 1, and lends itself to development without interference with existing features, such as paths or valuable trees.

The photograph shows work in progress on the cascade and water course, which are to be the scenic feature of the new garden. It is hoped that in this garden a home may be found for all our worth-while American rock-plants, as well as representative collections of material from other parts of the world.

T. H. Everett.

A GLANCE AT CURRENT LITERATURE[1]

New York Gardens has made its bow to the world with Louise Beebe Wilder as editor. In September, the first issue, Ethel Anson S. Peckham writes on bulbs, Mrs. John Donaldson on lawns, Carl H. Krippendorf on *Lycoris squamigera*, a little-known amaryllis, Grace C. Root on primroses, Mary R. Campbell on iris, Julia H. Cummins on "When is a Garden Wild?" Helen M. Fox on herbs for amateurs, Julia A. Latimer on Christmas roses, T. H. Everett on cuttings, and Mrs. Wilder on window-ledge gardening and on nurseries. Mary Mowbray Clarke opens a series entitled "The County Gardener." Departments include "Plant Brevities," "A Tree a Month," "From the Editor's Garden," "The Garden Shopper," "News of the Garden Clubs," and a gardening directory called "By the Way," including this month a letter from Mrs. William Crocker. This new magazine is published by State Garden Magazines, Inc., which has recently taken over the publishing of *New Jersey Gardens*, of which Mrs. Ella Porter McKinney is editor. The October number, which is now out, contains an equally interesting number of articles.

* * * * *

"Plant Propagating Hints—Old, Revised, and New" is the title of two articles by C. J. Hunn in the nursery department of the *Florists' Exchange*, Aug. 20 and 27. The information, which covered seeds and cuttings, was the same as that given at the first Long Island Nurserymen's School which was held in August at Farmingdale, N. Y.

[1] All publications mentioned here—and many others may be found in the library of The New York Botanical Garden in the Museum Building.

In *The American Home* for October, Romaine B. Ware gives a new type of planting chart for bulbs, showing the season of bloom, color, height, and the culture needed. In the same issue, A. S. Colby writes on shrubs that give both flowers and edible fruit.

* * * * *

The American Rose Society, through *The American Rose Quarterly* which appeared in September, issues an appeal for funds to carry on the work of rose-disease investigation. In urging people to plant roses this fall, it says, "Plants were never better and prices are low."

* * * * *

J. Horace McFarland has written on selecting rose varieties for next year in the October *Flower Grower.*

* * * * *

Rose culture is treated thoroughly by Charles H. Connors in Circular 251 of the New Jersey Agricultural Experiment Station. Under the title "Roses in the Garden," he deals with the uses of the shrubs, their soil and climate requirements; classification; methods of propagating, planting, cultivating, fertilizing, and generally caring for them; winter protection, and desirable varieties to plant.

CAROL H. WOODWARD.

TWO RECENT BOOKS REVIEWED

SUCCESS WITH HOUSE PLANTS[1]

This is a very brief and inexpensive guide to the culture of a few of the common house plants. It is based on wide experiences by the authors both in actual culture of plants and in advising amateur growers about the care of their house plants through the medium of the newspapers. Miss Kift, the senior author, is the daughter of a florist and grower and thus grew up with plant culture before she entered newspaper work. The sixty-six pages of the book give concise and thoroughly practical information. In so small a space it is, of course, impossible really to give full or

[1] Kift, Jane Leslie, and Hedenberg, Karin B. Success with house plants. Pp. 1–66. A. T. DeLaMare Company, Inc., New York City. $0.75.

satisfactory information on any great variety of plants. For instance, the treatment of Begonias is given only one half page, and while tuberous Begonias are recommended for indoor culture particularly in north windows, nothing is said about their particular requirements other than general comments on Begonias. But because of its conciseness, thoroughly practical character, and very modest price of seventy five cents, the book will probably have a wide appeal to the beginners in plant growing.

FORMAN T. MCLEAN.

PLANT LIFE IN WORDS AND PICTURES[1]

Why broad-leaved plants are found in moist, dim places, and plants with small leaves grow in sunny fields; how leaves arrange themselves in patterns to get the benefit of light, and how, on some plants, they are saved from baking sun, from chilling night winds, and from ravages by animals by marvelous adaptations of their structure—such stories form merely brief parts of a chapter or two in Eric Fitch Daglish's newest "How to see" book, in which he writes about plants in fascinating style.

His clear explanations of such points as how plants are nourished, how they are modified for their peculiar needs, and how pollination is brought about, make each function of each individual plant an adventure in the life struggle. Of particular interest are his descriptions of flesh-eating plants and of flowers built to admit only certain insects to the founts of pollen and the waiting stigmas.

All through the book are exquisite woodcuts by the author, who, though actively engaged as a biologist in England, has made a separate name for himself with his engravings.

Composed in language simple enough for a child of twelve to understand, this book is none the less of absorbing interest to an adult—even, I might say, to a botanist. If botanical text-books were written more in the style of Mr. Daglish's work, there would be far wider interest in and understanding of this invaluable but neglected science.

[1] How to see plants. Daglish, Eric Fitch. 122 pages, illustrated by the author with 9 woodcuts and many diagrams. William Morrow & Company, New York, 1932. $1.50 .

This is an American edition of an English work, and the first of its kind to be published in this country.

CAROL H. WOODWARD.

NOTES, NEWS AND COMMENT

Dr. H A. Gleason, Head Curator, has been asked to prepare manuscript on the family Melastomataceae for the new Flora of Surinam, now in course of publication in Holland under the editorship of Dr. A. Pulle.

Dr. Marshall A. Howe, Assistant Director, gave an illustrated talk on dahlias at the Field Day of the American Dahlia Society, held at the Connecticut State College, Storrs, Conn., on September 10 and another in connection with the annual exhibition of the Society, held at the Hotel Pennsylvania, September 22 and 23.

Mr. Eugene A. Rau, a well-known botanist of Bethlehem, Pa., died on October 16, at the age of 84. In 1928, Mr. Rau presented his herbarium of several thousand specimens, especially rich in mosses, lichens, and algae, to The New York Botanical Garden. An account of this collection, written by Dr. N. L. Britton, was published in the JOURNAL for November, 1928.

Meteorology for September: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were *97° on the 2nd;* 89° on the 6th; 82° on the 12th; and 89° on the 23rd. The minimum temperatures recorded were 49° on the 11th; 46° on the 19th; 42° on the 26th; and *38° on the 30th.* The total precipitation for the month was 2.42 inches.

Meteorology for October. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 78° F on the 2nd; *79° on the 9th;* 74° on the 10th; 69° on the 22nd; and 68° on the 26th. The minimum temperatures recorded were: 43° on the 7th; *34° on the 14th;* 43° on the 23rd; and 36° on the 31st. The total precipitation for the month was 5.17 inches.

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GENERAL INFORMATION

Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 41,700 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestal subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

Contributions to the Garden may be deducted from taxable incomes.

The following is an approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ———.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be sent to

THE NEW YORK BOTANICAL GARDEN
BRONX PARK, NEW YORK, N. Y.

VOL. XXXIII DECEMBER, 1932 No. 396

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JOURNAL
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CROCUSES AND HOW TO USE THEM

There has been a good deal of discussion about the origin of the name "Crocus." Some claim it comes from the Greek, some from the Chaldean, while some say that before Greek times the plant was known as Karkom, Kurkum, or Kurkuma, and others that the word is a corruption of the name of the district whence the best brand of saffron was brought in early times, Corycus. This is in Cilicia, and the Phoenicians brought this saffron ("Zaferan" in Arabic) to the western world of those days, calling it the "Corycian" brand of saffron.

Crocuses are natives of Europe and Asia Minor and eastward, toward Persia. They are indigenous from Spain and Portugal on the west, with a few found in north Africa, to as far east as the south of the Caspian Sea. The largest number of species is found in Asia Minor and the smallest in Palestine. Those in north Africa are Spanish species. All of the orange-colored species are found east of the Adriatic Sea. The saffron crocus has been cultivated from the earliest times and so wide was its use that we find escapes as far away as China. The corms of crocuses contain much starch, and in Syria and Asia Minor the bulbs of some varieties are eaten.

We see crocuses pictured in many old books, often several varieties. Usually it is the saffron crocus that is depicted, but in Elizabethan times there were evidently a number of varieties grown in gardens and some were even then horticultural forms. So, if we look in Parkinson's Paradisus, in Gerarde's Herball, in Crispin Le Pas, and in Hortus Eystettensis we will find delightful drawings of crocuses.

Parkinson divides them into spring- and autumn-blooming varieties and he says, " there is but one onely kinde that is called tame, or of the Garden, which yeeldth those blades or chiues that are vsed in meats and medicines, and many wayes profitable for other respects, none of the rest, which are all wilde kindes giuing any blade equall vnto those of the tame kinds or of any other vse, then in regard of their beautifull flowers of seuerall varieties, and they have been carefully sought out, and preserued by diuers to furnish a Garden of dainty curiosity." So Parkinson thought that the others besides *Crocus sativus,* or the saffron crocus, were all collected " wilde " plants, but in John Gerarde's book we see what we can almost be certain were garden forms.

To horticulturists crocuses naturally divide into two main groups just as they did for Parkinson, spring- and autumn-blooming. But when we come to their botanical classification, George Maw, who wrote the great monograph on the genus, puts crocuses into two divisions founded upon an entirely different scheme. In the first division he puts those species that have a basal spathe springing from the top of the corm (Involucrati) and in the second those without a basal spathe (Nudiflori). Each of these divisions has several groups and most of the groups contain both spring- and autumn-bloomers. The basis for this grouping is according to the style of the corm-covering or tunic. These tunics may be membranous with parallel fibers, reticulated (Reticulati) or with platted fibers (Intertexti). At one time classification according to the shape of the stigmata was attempted, but this, while it is extremely useful for identifying species, will not completely cover the whole genus.

Every year a new crocus corm is formed, which absorbs the old corm beneath it. The old roots keep active, as no new roots are made by the new corm at this time, though as it expands one large vascular root is made. This root is possibly contractile also. Certainly crocuses raised from seed lower themselves gradually until they are at the required depth for the size of the corm. Some say as the new corms are made on top of the old ones they tend to get too near the surface of the ground, but I notice if they do come near the top one season, the next they have gone down. So possibly they lower themselves only when it is absolutely necessary.

The tunics are only the bases of the leaves and the sheathing leaves. They protect the corm while expanding. As it increases in size the tunic comes loose at the base and slides up.

The foliage of some of the autumn-bloomers does not appear with the flowers. In some sorts there is a partial showing of leaves which grow to full stature later on, perhaps in spring for an autumn-flowering variety or after flowering-time for spring bloomers. In all but two species the leaves die away in the summer, so that is the best time for lifting. Transplanting, however, may be done at any time if the plants are immediately reset. Corms which are lifted directly after the foliage dies off should

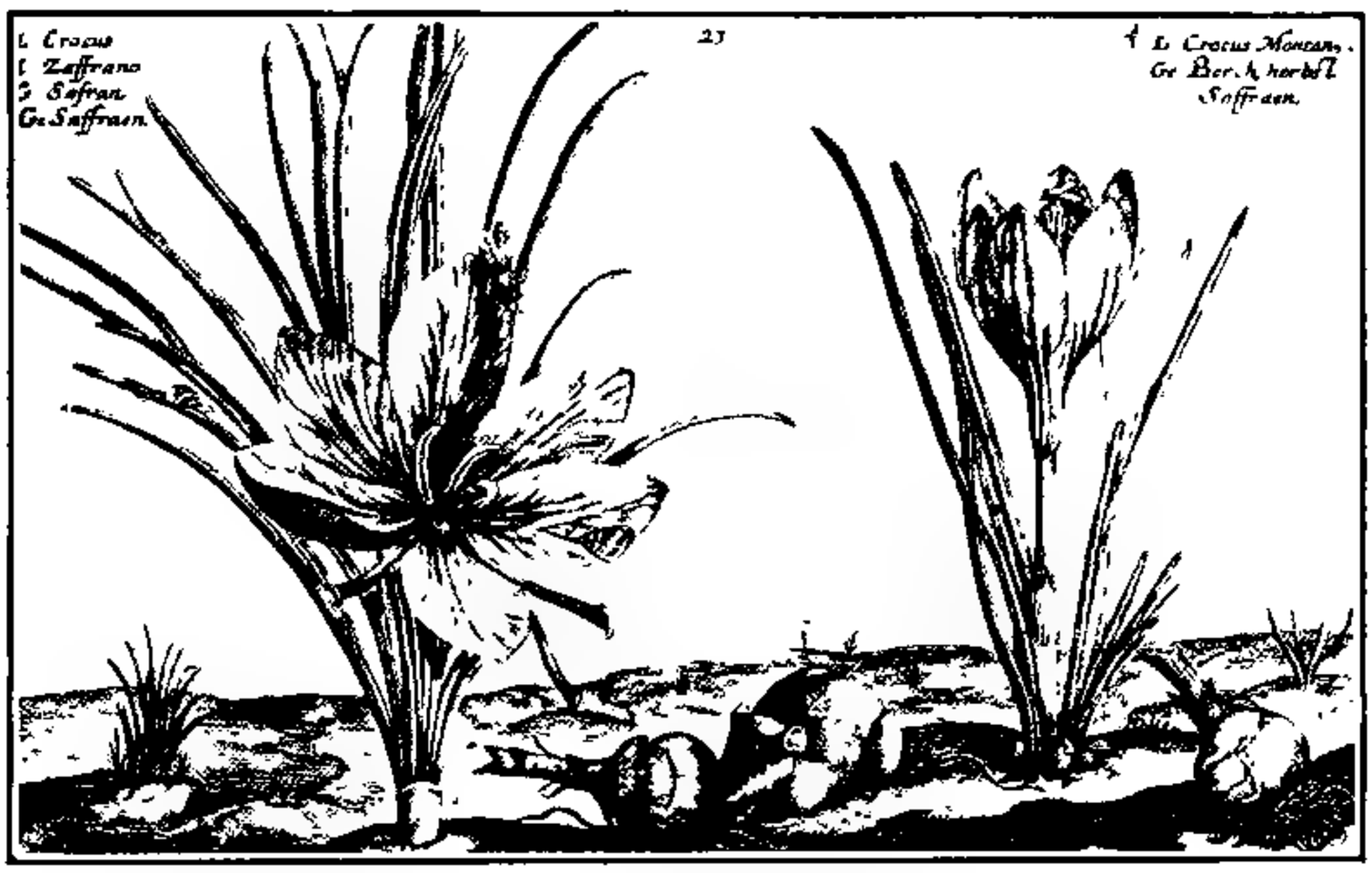

FIGURE 1. *Crocus sativus*, from Crispin Le Pas, 1614.

be cleaned of old tunics and roots as these parts may harbor fungus diseases. If they are not immediately replanted, they should be examined a second time just before putting them into the ground. Should you see bad dark indentations, the corms are best destroyed, but only slightly marked ones may be dusted with flowers of sulphur before planting or while awaiting planting.

Mice are deadly enemies of crocuses in that they dote upon the corms and dig them up to eat them. They do not like the smell of naphtha flake, so a pinch put in each crocus hole is a deterrent.

There are two good ways to plant crocuses, to naturalize them or to use them in patches combined with other small bulbs and

rock plants, either in the rock garden proper or on the edges of flower borders. They show best in large numbers and do not mind being crowded. They increase very easily from seed and from offsets. The easiest method for planting in the border is to take out the soil to a depth of four inches for the largest corms, less for smaller ones. Set the corms about, thicker in some places than others, and then fill in gently with the soil, firming it on the surface. Never put on a mulch until the ground is frozen hard. This is to prevent mice getting in. Peat moss as a mulch does no harm if it is not used too often. Once in three years is enough, as it is apt to make the soil too light. If you have some place to keep good soil where it will not freeze, it would make a very good mulch one inch thick, because, if you have used a ground cover of annuals in the summer and pulled them out in autumn, you will have removed some soil. It is a good idea to add sifted soil to the surface of bulb patches every year anyhow. A thin layer of well-rotted manure is the best mulch and there is no objection to a sprinkling of wood ashes. Fibrous-rooted plants which do not go too deep may be used as a ground-cover. Alyssum, annual lark-spur, Johnny jump-ups, and such are useful, or sedums planted "for keeps" are good, provided they are not allowed to get too rank and thus choke their companions.

The most attractive way to plant is perhaps the natural way but it is not worth while unless large numbers are used and it is better to select only a few varieties, as the resulting effect will be bolder. Avoid definite patterns, such as circles, clumps, squares, and straight even bands. Plan long drifts or colonies, thicker at one end than the other, and blend the colors so a deep one such as dark purple will pass off to white through mauve or lavender or, again, yellow will have pale mauve between it and white. To use all one color is not successful either. All white too closely resembles the snowdrifts but lately spent, and all yellow often is too crass; all purple and mauve completely disappear in the landscape and need the addition of pale yellow to bring them to notice and display their full beauty. Sunlight is so watery in spring and there is so much of brown and gray that we need a touch of yellow to hearten our effects.

If crocuses are planted in grass, of course the latter may not be mown until the crocus foliage has ripened. This, in our local-

ity, will be in June. Borders in grass along hedges or fences are attractive if they are not made too even in shape, and the long grass there will be less noticeable. The center can be mown, as can a lawn which has bulbs naturalized around its edges. In an orchard, crocuses can often be used provided they are planted where the grass is of a scant nature. Rings around trees are not attractive, but patches on the sunny side, partly under a tree, are always charming. If you use a Barr's bulb-planter to make your holes in the grass, do not push it down all the way as you would for narcissi; three and a half to four inches is sufficient. You can cut flaps with a spade and set the bulbs below, pressing the flap back and walking on it afterward.

Rabbits delight in nibbling off crocus blooms and leaves, particularly the pale mauve varieties. A little naphtha flake sprinkled on the plants will discourage them. Curiously enough, rabbits do not relish the deep purple varieties, but always go for the lavender ones. Birds peck the yellow ones to pieces while searching for insects or honey. However, if you have enough yellows, the birds make little headway so far as destruction of color effect is concerned. Mr. E. A. Bowles, the "King of Crocus," advocates putting out water for the birds to drink, as he says they then leave the flowers alone.

If autumn crocuses are planted in your grass, do not mow it after August. In November, when the flowers are gone, you can cut it just enough to make it tidy for spring.

Of the groups of crocuses, those best known to our American gardens are nearly all raised from one species, *Crocus vernus*. The true species is very attractive in itself and if we choose the smaller, more compact forms for naturalizing we do best. It seems better, too, not to select a variety for garden use just because it is large, as the large ones are quickly destroyed by our dashing spring rains. Some very exquisite combinations can be made with the early squills, such as *Scilla sibirica* in its white and turquoise forms. Grape hyacinths and also the china-blue *Puschkinia scilloides* with *Hyacinthus azureus* make good companions for crocuses.

The earliest to bloom here are two species, *Crocus Sieberi* and *C. Imperati*. The former belongs to the division Nudiflori, namely, with no basal spathe, and has a reticulated corm tunic. The flow

ers, which are of a lovely pink mauve, are not more than two and a half inches tall, but they open out well. These are charming in proximity to *Iris reticulata,* particularly the light-blue form. *Iris verna* or *I. arenaria* (yellow) may also be used, and a lavender variety of *Phlox amoena* will help the combination.

Crocus Imperati is in two tones, having an entirely different aspect outside and inside, so when open the color effect is startlingly unusual -buff outside and brilliant lavender or rose-mauve on the inside. The flower is long and extremely beautiful, one of those treasures one becomes more and more attached to as the years roll by.

The tiny yellow *Crocus susianus* is another early fellow—brilliant orange-yellow with dark lines on the outside. This does very well in grass and belongs botanically to the same group as *C. Sieberi.* I combine *Crocus susianus* with *Scilla sibirica,* the blue or the white, and find that *Tulipa Kaufmaniana* near by is not out of place, particularly if it is the variety with a yellowish cast.

The easiest grower of any early crocus here is *C. Tomasinianus,* which comes from Dalmatia and Serbia (or what *was* Serbia). This slender delight varies greatly in color from pale mauve to quite dark, it increases rapidly, and is immensely easy to transplant while in bloom, so may be thinned at that time without disturbing its equilibrium at all!

The newer color-forms of low-growing phlox are good and squills or glory of the snow (*Chionodoxa*) are excellent companions for it. Although the crocuses may be spent when the phlox comes into bloom, one can make successions of similar color in different material. The phlox helps to carry on the color scheme, which may be amplified with other plants of low stature, such as the dwarf bearded iris, Bride (white), and near it Mont Blanc crocus, the yellow *Crocus aureus,* the dwarf iris Orange Queen, the pale-blue iris Spring Skies, and Crocus Maximilian. If you want other things to bloom at the same time as the crocuses, add *Iris reticulata* and *Scilla sibirica cyanea.* The true *pumila* irises (which are rare in commerce or gardens) are excellent because they are earlier than the dwarf bearded varieties usually grown. These come in purple, white, and yellow and may be known by the tube beginning at the ground and the almost complete absence of stem.

Before *Crocus aureus* comes into bloom we will find the lovely little *C. chrysanthus.* This ranges from deep orange-yellow to palest sulphur and white and I know of nothing more beautiful than a colony of a pale sulphur form of this. This species is native of northern Greece, Asia Minor, and Turkey in Europe, and is perfectly hardy. Mr. Van Tubergen and Mr. Bowles have raised many beautiful forms which are now coming into commerce.

Less pronounced in color is *Crocus biflorus,* which has deep purple-brown lines on a white ground. Both this and *Crocus chrysanthus* belong to the group with the ringed or annular tunics and the division Nudiflori. Another striped spring-bloomer is *Crocus versicolor,* native of southern France and Italy. This, while hardy here, does not increase rapidly and I suspect is much less hardy than some of the others. In the Alpes Maritimes I have seen it growing between rocks and stones that were so close together one wondered that there was room for a bulb of any sort. Here it was not in thick patches but was scattered—perhaps one of those plants of a solitary nature. There are plenty of such.

The best known of the autumn-blooming crocuses in America is perhaps the blue-lavender *C. speciosus,* but the best known from the point of view of history and interest should be the saffron crocus (*C. sativus*). This is a light mulberry-red, with orange stigma, which is so long it hangs out of the flower. These stigmata were in great demand for flavoring, for medicine, and for dye. The industry is small nowadays but at one time it was very widespread. Saffron is still used in Devonshire and Cornwall for flavoring cakes, and the southern European peoples, especially the Spanish, use it regularly in their cooking. It has always been expensive, as it takes so many of the stigmata to make even a part of an ounce of saffron. An interesting study would be just this one species and its forms. I find it quite hardy here but not a very prolific bloomer. However, it increases and no doubt if it were lifted and separated every two years, as was the custom when grown for commerce, it might do better. Most crocuses like to be left alone, but this is really a cultivated plant which has lost its wild nature.

The best autumn bloomers are *Crocus zonatus,* early pink-mauve, *C. pulchellus,* small goblet-shaped, mauve with yellow throat, several forms of *C. speciosus,* and *C. longiflorus.* The

latter is about the last to flower before the ground freezes solidly and is always in bloom here at that time. It is a deep pinkish-mauve, with a lovely orange stigma and is one of those with foliage part way up while in flower.

To decide upon a favorite in such a genus is almost impossible; one thinks it all settled and then is drawn away by some new beauty discovered in another species or variety. As each comes along, it seems more desirable than the previous ones. Of the spring treasures the sulphur *Crocus chrysanthus* is perhaps first favorite with me. Of the autumn ones, who can say? *Pulchellus?* Yes, on that day it opens first. *Speciosus albus?* Always while looking at it! *Longiflorus?* Yes, always. But as I say this I remember the saffron and that day when a small boy came running calling, "Mother, come see a crocus that is crying its eyes out!" Then I know it is that one that intrigues me most and lends to my garden "dainty curiosity!"

ETHEL ANSON S. PECKHAM.

INDEX KEWENSIS IN LOOSE-LEAF LEDGER FORM

Time occupied by botanists and others in consulting Index Kewensis, in searching through the thirteen different alphabetized series of entries in the original work and in the seven supplements, has been reduced by approximately ninety per cent, through the new loose-leaf ledger form recently compiled at The New York Botanical Garden. At the same time the danger of overlooking important entries has been practically eliminated by the combining of all generic entries in a single alphabetic sequence.

Among systematic botanists, Index Kewensis is the most frequently consulted work in any botanical library, hence this great saving in time is of special importance to them. This indispensable reference work comprises 4,494 folio pages, the several hundred thousand species listed being arranged in three columns per page. In consulting Index Kewensis, it is necessary to search, not only in the original work published in 1895, but also in the seven supplements which have appeared between 1901 and 1929, in the three *addenda et emendanda* to volumes 1 and 2 of the

original work, and to those in each of the first two supplements, if one wishes to be sure of not overlooking a published binomial.

In an attempt to devise a single alphabetical sequence to replace the thirteen existing sequences, it seemed most practical to paste the entries into a loose-leaf ledger form which would allow indefinite additions as future supplements appear.

After a preliminary survey, the Moore loose-leaf binder with four binder posts was selected. It was decided to paste the entries in four columns per page; accordingly, a standard size of paper 17 × 14 inches was selected to fit special binders 18 × 15 inches and 5 inches thick. For permanency, linen record paper was used. The columns were spaced so that it is possible to add

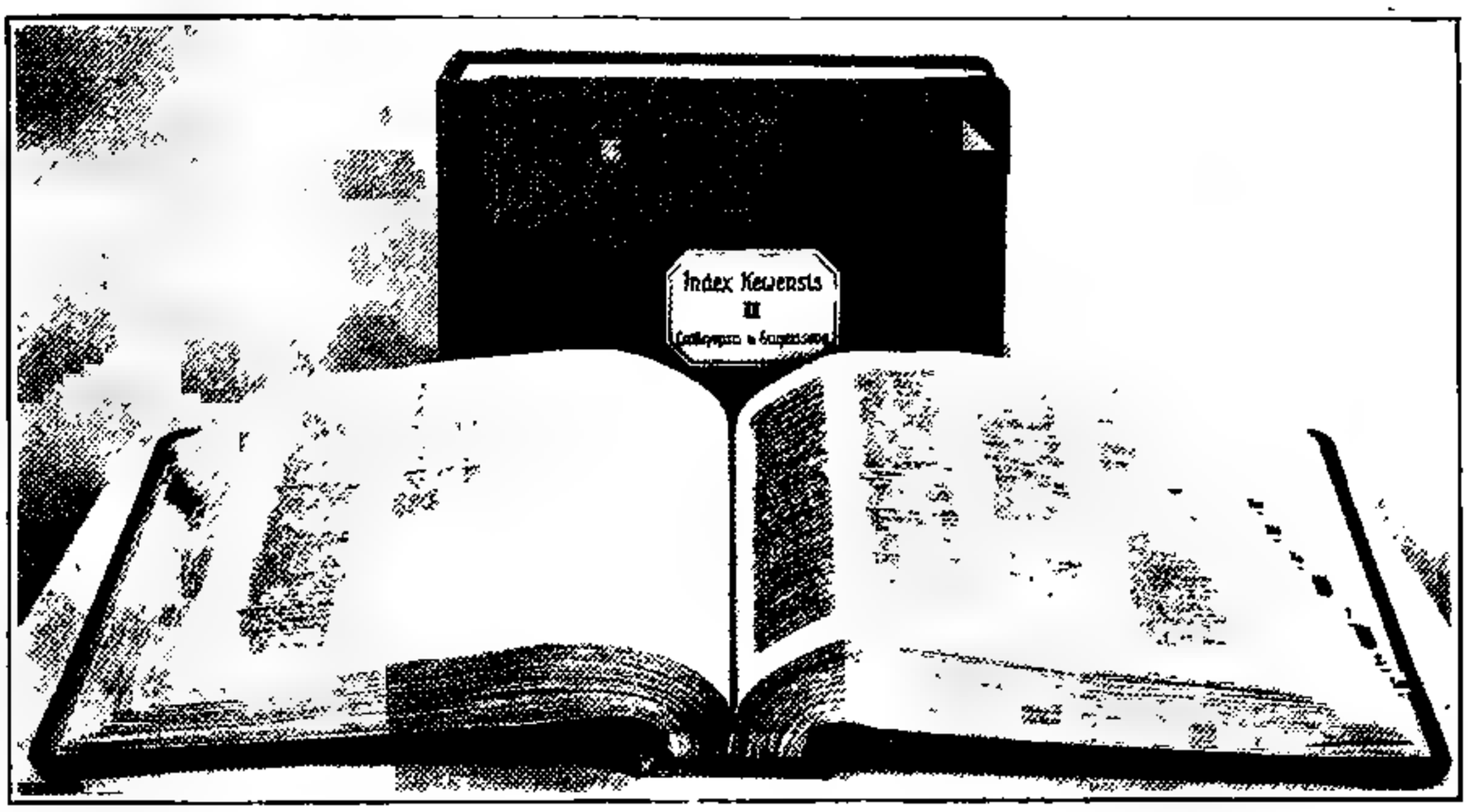

FIGURE 1. Index Kewensis in the new form it has been given at The New York Botanical Garden.

corrections and critical notes, and their length, 12 inches, leaves a proper margin at top and bottom. A preliminary estimate indicated that six loose-leaf binders would be necessary. When the sheets were all pasted it was found that they actually filled five binders and one half of the sixth one. A total of 2,457 loose-leaf ledger sheets were used.

Two extra copies of Index Kewensis and its seven supplements were acquired. All entries in the original work were stamped IK, and those in the supplements IKS1, IKS2, etc. The many thousands of generic entries were then clipped, and alphabetized

in one series in specially designed dummy forms, carefully checked for sequence, and then pasted. In pasting the clipped entries, only one side of the sheet was used except where large genera were involved, the entries in these cases being pasted solid on both sides of the sheet, over page continuation being indicated by the stamped legend "over" in the lower right-hand corner. Any unoccupied part of the last page of entries for large genera was left vacant for future use. Indefinite additions may thus be made without breaking the sequence in the large genera, and with very little difficulty in the case of small ones by using at first the reverse side of the sheet for additions to the original entries, proper annotation to be indicated by stamping "over" where additional entries are made, and by the insertion of new sheets when, where, and as needed. Additional sheets may be of either the white linen paper of the original, or of some contrasting color.

The completion of this project gives The New York Botanical Garden a unique set of Index Kewensis, superior in its mechanics to any of the very few pasted-up copies in other institutions, only two of which are known to us one at Kew and one at the Rijks Herbarium, Leiden. To staff members who most frequently consult this work, the new form is a great boon in that it saves much time and energy on the part of the individual, and, what is even of greater advantage, it reduces the chances of overlooking entries.

This important task was consummated through the utilization of assistance granted by the Emergency Work Bureau. Two teams of four women each were organized, the work occupying them for several months. The labor cost was in excess of $2,000 on the basis of the actual remuneration granted by the Emergency Work Bureau.

This is one of the very numerous pieces of productive work accomplished at the Garden through assistance granted by the women's division of the Emergency Work Bureau, and is a task that the institution itself could not have undertaken on the basis of its own resources, because of the cost involved. As it was, the actual cost to the Garden for this outstanding addition to its equipment was the price of two sets of the publication necessary, the loose-leaf binders, and the paper.

This eminently practicable compilation is already serving its purpose to other organizations that occasionally require data from Index Kewensis. Thus, a request from a large commercial firm for all entries under *Derris* was simply and effectively complied with by photostating the single page of *Derris* entries; otherwise it would have been necessary to copy, photograph, or photostat the entries in eight different volumes.

E. D. MERRILL.

SHOWY-FRUITED NATIVE SHRUBS AND TREES USED FOR WINTER DECORATION

Looking in florists' windows at this season of the year, one sees a number of showy fruiting sprays used for winter decoration in the home. Not many, however, know the source of these, and still less their botanical affiliations.

It is interesting to note that practically all of them are not only native plants, but fairly plentiful within the local area where civilization has not too thoroughly destroyed the native shrubs and trees.

The one which makes first appearance is bittersweet, the fruit of *Celastrus scandens,* a woody vine, which climbs high into trees or scrambles over other shrubs, or stone walls, its drooping racemes of yellow or orange berries, which burst open exposing the scarlet seeds within, being collected in great quantities, much to the detriment of the plant, which is of course destroyed by reckless picking, thus removing the continuance of its beauty.

Two members of another genus of the same family are also ornamental but not much used, as they lose their seeds too quickly to be of lasting value. These are the Wahoo or burning bush, *Euonymus atropurpureus,* with deep-rose fruits which burst open, exposing scarlet seeds, and the strawberry bush, *Euonymus americanus,* with dark red, prickly fruits, likewise containing scarlet seeds. Both of these plants are rare in the wild state within the local range, but the Wahoo is commonly cultivated for outdoor ornament.

These genera are members of the Celastraceae, or Staff tree family, the staff-tree being an old-world member of the genus *Euonymus.*

Next to make its appearance on the market is the bayberry, *Myrica carolinensis,* a shrub whose brown branches and twigs, thickly studded with grayish-white "berries" are also in much demand, as their stronger substance permits their not drying out as the fleshy berries do. The early settlers used the wax covering which gives these fruits their color to make candles, removing it by boiling the fruits, upon which the wax becomes detached and floats to the surface of the water. This plant is a member of the Myricaceae, or Bayberry family.

Now and then the flat-topped clusters of the mountain ash, *Sorbus americana,* with small red berries in an erect cyme, and the European Rowan-tree, *Sorbus Aucuparia,* with large deep-orange berries in an erect cyme which droops when ripe by reason of the weight of the fruit, are used, but shrivel up so soon after picking that they are of much more value for ornament if left on the tree.

Three species of chokeberry, *Aronia arbutifolia, A. atropurpurea,* and *A. melanocarpa* also present possibilities, but all have also the habit of shriveling too quickly. They are splendid while they last, however, and the time may be lengthened by keeping the stems in water. Their colors are, respectively, red, dark purple, and purplish-black. They grow in lateral and terminal clusters on shrubs, the fruits of the first two upright, the last, drooping.

The two genera named in the preceding paragraphs are members of the Malaceae, or Apple family, and are closely related to the common apple.

One species of *Smilax, S. laurifolia,* is used for decorating banquet halls and rooms to be used for festive occasions. This is another high-climbing vine, the leaves evergreen, with lateral clusters of blue-black berries, though the plant is often collected while the berries are still green. These berries do not reach maturity until the year after flowering and only old vines bear fruit, so that this plant needs protection from ruthless collecting if it is to be preserved for future use. The vine grows within the local range only in the pine-barrens of southern New Jersey, but is much more common further south in the Coastal Plain. Several other species of *Smilax,* while not evergreen, have ornamental fruits, and two of these, the greenbriers or catbriers, *S.*

rotundifolia and *S. glauca,* both with blue-black berries, are exceedingly common within the local range, while another, *S. Walteri,* with coral-red berries, is rare in the pine-barrens but more plentiful further south. The smilaxes are members of the Liliaceae, or Lily family. All are high-climbing vines with sharp thorns, forming dense tangles of growth.

The small double red berries of the partridge-berry or twinberry, *Mitchella repens,* are also used, being placed in closed jars and kept moistened, looking quite attractive with their evergreen leaves which are collected and placed in the jar with them. This plant is a member of the Rubiaceae or Madder family, among whose native members the bluets (*Houstonia caerulea*), the button-bush (*Cephalanthus occidentalis*), and the bedstraws (*Galium* spp.), are perhaps the best known.

One sometimes sees jars of the bright red berries of the wintergreen, *Gaultheria procumbens,* often sold also in bunches, the bunches consisting of the short stems of the plant tied together. This is the fruit of a shrub whose stems run just below the surface of the ground, sending up at intervals the short upright stems with a few evergreen leaves at the top, and hanging beneath the leaves, a few berries. This plant is also one of the sources of oil of wintergreen, used medicinally and for flavoring. This is a member of the Ericaceae or Heath family, which contains the Rhododendron, the mountain-laurel (*Kalmia latifolia*), and the trailing-arbutus (*Epigaea repens*).

Two trees whose fruits are also much used are the pepper-tree, *Schinus Molle,* and the Toyon, *Heteromeles arbutifolia,* both of which are shipped into the New York region from California, where the Toyon is native and the pepper-tree commonly cultivated. The pepper-tree is native in South America, but was brought into California by the early Spanish missionaries. It is a member of the Anacardiaceae or Cashew family, which contains also the cashew-nut (*Anacardium occidentale*), the pistachio-nut (*Pistacia vera*), the poison ivy and the sumac (*Rhus* spp.). The fruits of the pepper-tree are long panicles of rose-colored berries. Those of the Toyon are red berries in dense clusters, borne thickly along the branches, much resembling the red chokeberry, to which they are closely related.

The Holly family or Aquifoliaceae, however, is the source of more of these winter ornaments than any other, and, in company with the bittersweet, is most in need of protection. In its ranks are about nineteen native species, all belonging to the Holly genus, *Ilex,* of which the European species *I. Aquifolium* is the original species and the Holy-tree of Norse mythology, giving rise to our use of it for holiday decoration. Our native species may be mentioned under three heads as follows:

1. The evergreen group, containing the spiny-leaved *Ilex opaca,* the most widely used, which grows throughout the Atlantic Coastal Plain, *I. cumulicola,* a spiny-leaved species of central Florida, and the three smooth-leaved ones, *Ilex vomitoria,* the Yaupon, *I. Cassine,* the Dahoon, and *I. myrtifolia,* the myrtle holly. The Yaupon and Dahoon are not native north of southern Virginia; both have their branches densely covered with red berries, and have smooth, shiny, elliptical leaves, those of the Yaupon less than one inch long and crenate-margined, those of the Dahoon two or three inches long.

2. The deciduous-leaved group, containing eleven species, three of which, *I. verticillata* with many varieties, *I. laevigata,* and *I. monticola,* range into the local area. All of these have membranous leaves, which drop early in the fall, leaving the branches thickly studded with dense clusters of bright red berries, which few people recognize as holly, and which persist even into the following year. The remaining species, *Ilex decidua, I. longipes, I. ambigua, I. Amelanchier, I. Beadlei, I. Cuthbertii, I. Buswellii,* and *I. Curtissii,* are more southern in range and are equally ornamental. Of this group, *I. verticillata,* the winter-berry or black alder, is most frequently used, as it is the most widely spread species.

3. The black-berried group, also evergreen, with glossy black berries, which has not the color to be used much as ornament, but deserves to be more widely known, as it is really quite attractive. Of this group, the ink-berry, *Ilex glabra,* ranging from Maine to Florida in the sands of the Coastal Plain, is the only species in the local range, the other two, *Ilex Krugiana* and *I. coriacea,* occurring further south.

In passing, one other genus might be mentioned, the mountain holly, *Nemopanthus mucronata,* also of the Holly family, with

long-stemmed red berries, which grows usually on rocky mountainsides and in mountain swamps.

All the hollies are dioecious, which means that the staminate and pistillate flowers grow on different trees; thus one often sees holly trees which never bear fruit. These must nevertheless be grown with or near the others, as they are the staminate trees, whose pollen is necessary if the pistillate ones are to produce fruit.

On account of the rapid destruction caused by the collection of great quantities of the fruits of all the above-mentioned plants, it is earnestly recommended that they be grown commercially for this purpose to prevent their extermination, which will certainly take place if such procedure is not followed, and thus we will be deprived of some of our showiest-fruited native trees and shrubs as well as of our winter ornaments. All are easily grown from seed, and the local ones are quite hardy and fairly fast-growing, once started.

In addition to the above, there is one plant which cannot be grown easily, the mistletoe, *Phoradendron* spp. of the Mistletoe family, or Loranthaceae, whose white berries and yellow-green leaves are one of the most desirable of Christmas decorations. This is parasitic upon the branches of various deciduous-leaved trees and since it is dependent upon its seeds for propagation, ruthless collecting may eventually lead to its extermination.

Recently the three native species of mistletoe, one of which grows from New Jersey southward, have been drawn upon so heavily as seriously to deplete the supply. Previously the European mistletoe, *Viscum flavum*, was shipped in great quantities to this country, and the growing use of the native species may mean either that Europe is conserving its supply, or that it has been destroyed, which should be a lesson in conservation for the United States.

EDWARD J. ALEXANDER.

ASIATIC IMMIGRANTS IN THE BOTANICAL GARDEN—II

The naturalized exotic shrubs and trees in The New York Botanical Garden have appeared in many different local habitats. Some are to be found in the exposed and frequented parts, often near the paths and roads; other are met with only in densely shaded spots and those less frequented by visitors.

The two trees considered on this and the next page are well known and have outstanding characteristics. The winged fruits in the case of *Ailanthus* or the winged seeds in the case of *Paulownia* are distributed by the wind, their dispersal thus differing from the two fleshy-fruited plants considered in a former note, where the agents were birds or mammals. Although their very numerous winged seeds are widely dispersed in all directions by the wind, many, contrary to the biblical parable, doubtless fall in good ground and perish, while those that fall by the "wayside," so to speak, sprout and the plants often flourish.

The Karri-tree *Paulownia tomentosa*—is the best known of the eight species native in China. It is also known as Paulownia-tree, Princess-tree, or Empress-tree. The generic name is from that of a European princess, Anna Paulowna.

This was first described as a *Bignonia* in 1784. In 1834 the genus *Paulownia* was described, and in the same year the tree was introduced into European horticulture through the Garden of Plants, Paris. Within a decade of its European introduction it was brought to America. The actual date of the advent of Paulownia in the present Garden area, like that of Ailanthus which is considered below, is uncertain. However, it seems to have been just after the middle of the past century. Notes on this tree have appeared in this Journal a number of times.[1]

Also like the Ailanthus, it was officially introduced into the Garden's plantation early in this century (1905) by seeds received from European botanic gardens. The Karri-tree was of great interest in Europe after its introduction. It has been illustrated in plant journals no less than fifty-six times—sixteen times in color. Several varieties, based on the color of the flowers and the hairs on the leaves, are in cultivation. The leathery

[1] Jour. N. Y. Bot. Gard. **18**: 31–35. *pl. 191;* **21**: 72–73; **23**: 1–3. *pl. 267, 268.*

fruits, which are borne in erect panicles, finally open and release numerous small winged seeds. These doubtless fall in all conceivable locations, but seedlings seem to start most abundantly in apparently unfavorable situations, such as rocky hilltops, rocky river-banks, and cinder piles, such as on railroad embankments. The wood is used in cabinet-work and for the tray associated with the knife in the very personal national ceremony of Hari-Karri, in the country where the tree was first cultivated.

The Tree-of-Heaven the name said to be a translation of the Asiatic name Ailanto—is the best known of the nine species of the genus *Ailanthus* known to be native in Asia and Australia. This tree has been in cultivation in Europe for about two centuries. Two trees from China were planted in the Garden at Kew in 1751. In a hundred years they had attained a height of between sixty and seventy feet. The date of the introduction of the Tree-of-Heaven in the Garden is uncertain, for it was there before the area was set aside for the purposes of a botanical garden. However, it was officially introduced after the inception of the Garden in 1904 by seed received from European gardens

The Ailanthus is a vigorous grower. It may be allowed to grow into a large tree or it may be cut back frequently and used as a screen. Its foliage is ample, the compound leaves much elongate. The winged fruits are produced in great numbers, and hang in large festoons among the leaves. Several varieties, based on the leaves and the color of the fruits, are in cultivation. It is naturally the host to several kinds of silkworms. When it was first introduced into Europe this fact directed much interest to the tree and great hopes for sericulture on a large scale were announced in various sections.

Ailanthus has been illustrated in plant journals about eighty times, six times in color. Although the Ailanthus grows best in an abundance of good soil, it also sprouts and thrives well by the "wayside." Seeds lodging in crevices of brick walls, in corners on roofs, and in various other unusual habitats, grow, and the plants thrive better than one would expect. However, the two subjects just discussed have been in cultivation in the Orient for ages, and thus have become accustomed to a multitude of habitats.

JOHN K. SMALL.

A GLANCE AT CURRENT LITERATURE[1]

The artist's point of view in garden composition is treated by Egbert Hans, who takes his readers to an artist's studio where principles can be learned at first hand, in the November *Gardener's Chronicle of America.*

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"Putting the Garden to Bed" is the subject of "Three Gardeners" writing in *New Jersey Gardens* for November. In the same issue, J. Horace McFarland writes on thornless climbing roses, making a plea for the production of more thornless hybrids.

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The Arnold Arboretum *Bulletin of Popular Information* issued November 5 contains some worth-while information on grafting, by Kenneth S. Chester.

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The pruning of roses to make them produce the most glorious bloom is treated in comprehensive manner in *The American Home* for November. A number of diagrams clarify the text.

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In *Horticulture* for October 15 it is announced that Dr. E. L. Gambrell of the agricultural experiment station at Geneva, N. Y., will give out directions on control of gladiolus thrips.

* * * * *

G. A. Phillips names what he considers the most desirable varieties of Delphinium in an article on "The Return of the Blue Delphinium" in *The New Flora and Silva* for October.

* * * * *

Sketches from the history of medieval botany in the Old World are included in "Herbs, Herbals, and Herbalists" by Dr. Helen Bancroft of the School of Rural Economy of Oxford University, in *The Scientific Monthly* for September.

This same magazine contains a message from P. L. Ricker, president of the Wild Flower Preservation Society, in which he recommends picking no attractive wild flower unless there are from 100 to 200 in a patch, and then picking only one in ten.

[1] All publications mentioned here—and many others may be found in the library of The New York Botanical Garden, in the Museum Building

America is not the only place seeking to preserve its natural flora. In the *Rivista Italiana delle Essenze, dei Profumi, e delle Pianti oficinali,* a series of articles is running, pleading for the preservation especially of officinal plants.

In the October number of this magazine, is one article of a series entitled "Art in Gardens," which takes up famous historical gardens throughout the world. Gardens of Germany, the Scandinavian countries, Russia and Poland, Turkey, China, and Mexico and Peru are treated in this issue. Next will come gardens of papal Rome and the Renaissance.

* * * * *

Aquatic plants utilized as aids in mosquito control is the subject of Robert Matheson of Cornell University in a reprint from the Smithsonian Report for 1931. Enlarged pictures show specimens of *Utricularia* with mosquito larvae caught in the bladders, where they would be consumed.

Also reprinted from the Smithsonian Report is an illustrated pamphlet on "Some Wild Flowers from Swiss Mountains and Meadows" by Casey A. Wood.

* * * * *

"Wild Flowers of Spuyten Duyvil and Riverdale Sections of New York City" are treated by Mary L. Sefferien in *Torreya* for September and October. The author describes the scene from season to season and lists nearly 300 species.

* * * * *

Efforts being made in England toward beautifying the roadsides are revealed in an insert in the September *Journal of the Royal Horticultural Society,* which announces a large calendar issued by the Roads Beautifying Association, illustrated with 12 pictures of tree varieties and English woodland scenes. The magazine itself contains many fine photographs of gentians, also a description of the garden of the King and Queen at Sandringham.

* * * * *

"Diseases of Narcissus" is the title of Bulletin 304 of the Experiment Station of Oregon State Agricultural College.

CAROL H. WOODWARD.

PUBLIC LECTURES DURING DECEMBER, JANUARY, AND FEBRUARY, 1932–33

Free lectures and demonstrations will be given in the Central Display Greenhouse, Conservatory Range 2, on Saturday afternoons at 3:30 P. M., as follows:

Dec. 3. "Hardy Roses," Mr. Edwin Beckett, Supt. Ogden Reid Estate, Purchase, New York.

Dec. 10. "Outdoor Winter Gardens," Mr. Kenneth R. Boynton, Head Gardener.

Dec. 17. "Selection and After-care of Christmas Plants," Mr. T. H. Everett, Horticulturist.

Jan. 7. "Disease and Pest Control," Dr. B. O. Dodge, Plant Pathologist.

Jan. 14. "Hardy Plants from Seed," Mr. James Esson, Supt. Mrs. Roswell Eldridge Estate, Great Neck, Long Island.

Jan. 21. "Some New Evergreens and Their Care," Mr. Thomas Little, Colonel Montgomery Estate, Cos Cob, Connecticut.

Jan. 28. "Growing a Succession of Cut Flowers," Mr. G. H. Gillies, Supt. Marshall Field Estate, Huntington, Long Island.

Feb. 4 "Plant Food from the Soil," Dr. Forman T. McLean, Supervisor of Public Education.

Feb. 11. "Vegetables," Mr. Robert Scott, Mrs. W. A. Burden Estate, Mt. Kisco, New York.

Feb. 18. "Early Care of Annuals," Mr. Donald Crighton, Supt. Paul Moore Estate, Convent, New Jersey.

Feb. 25. "Rock Gardens," Mr. T. H. Everett, Horticulturist.

How to Reach the Conservatory

Conservatory Range 2 is situated at the eastern side of the Botanical Garden, north of the Allerton Avenue Entrance It is most conveniently reached from the Allerton Avenue Station of the White Plains extension of the Subway from East 180th Street. Visitors coming by train to the Botanical Garden Station should inquire at the Museum Building.

NOTES, NEWS, AND COMMENT

Dr. E. D. Merrill is one of the committee to award the prize of $1,000 for a notable paper presented at meetings of the American Association for the Advancement of Science and affiliated societies held at Atlantic City, December 27 to 31, 1932.

Recently by the aid of help available through the Emergency Work Bureau, an exact count of the fungi in the collection of The New York Botanical Garden has been made, under the supervision of curatorial assistant, Miss Augusta Finkelstein. This, the first definite record ever obtained, showed nearly a quarter of a million specimens of fungi and lichens distributed as follows:

Myxomycetes	2,154
Phycomycetes	4,269
Ascomycetes	57,256
Fungi Imperfecti	32,111
Lower Basidiomycetes	46,572
Higher Basidiomycetes	60,062
Miscellaneous collections	7,222
Undistributed exsiccati	12,610
Lichens	27,590
Total	249,846

A large reference collection of fungi is just as necessary to a mycologist or a pathologist as the library which contains the records of these plants. It is very difficult to put a money value on this collection. It is invaluable for reference purposes. The collection of lower basidiomycetes (rusts and smuts) is the second largest such collection in America. While comparison cannot be made in other groups, those also are relatively large.—F. J. SEAVER.

Dahlias at The New York Botanical Garden were killed by frost on the morning of November 4. In eight out of the fifteen years of existence of the special dahlia border, the flowers have reached the month of November without serious injury by frost. For the third year in succesion the summer and early autumn

rainfall in Bronx Park was about half the normal and the dahlias made a slow start, but most of the plants made a beautiful showing during October. The main borders to the south of the railway plaza included about 1100 plants, representing 441 varieties. In addition, there was a special bed of about 200 plants, supposedly disease-free, north of the Museum Building; this was under the direction of Mr. Philip Brierley of the U. S. Department of Agriculture, who, for the past three seasons, has been making studies of dahlia diseases at The New York Botanical Garden, at The Boyce Thompson Institute, and at Cornell University. The miscellaneous dahlias in the flower-beds around Conservatory No. 1 brought the total number of dahlia plants in the Garden's 1932 collections to about 1450.

The Botanical Garden's out-door collection of chrysanthemums, most of which this year were planted a little to the northwest of the Museum Building, made an especially good showing in the latter part of October and through November until blackened by a heavy freeze on the morning of November 27.

A monthly conference of the Scientific Staff and Registered Students of the Garden was held on the afternoon of November 16th, at which time the following program was presented:—"Notes on the mosses of Porto Rico" by Mr. R. S. Williams, and "Anatomical studies of the leaves of species of Abies" by Edmund H. Fulling.

Dr. W. W. Campbell, President of the National Academy of Sciences, has appointed Dr. E. D. Merrill a member of the Academy's Committee on Conservation of Natural Resources. The other members of this committee are Drs. John C. Merriam (chairman), J. McKeen Cattell, David White, Isaiah Bowman, Clark Wissler, and Fred E. Wright.

Meteorology for November: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 61° on the 5th; 58° on the 11th; *62° on the 19th;* and 57° on the 25th. The minimum temperatures recorded were: 28° on the 4th; 31° on the 14th; 28° on the 18th; *11° on the 27th;* and 20° on the 29th. The total precipitation for the month was 8.46 inches. The first killing frost occurred on the morning of the 4th.

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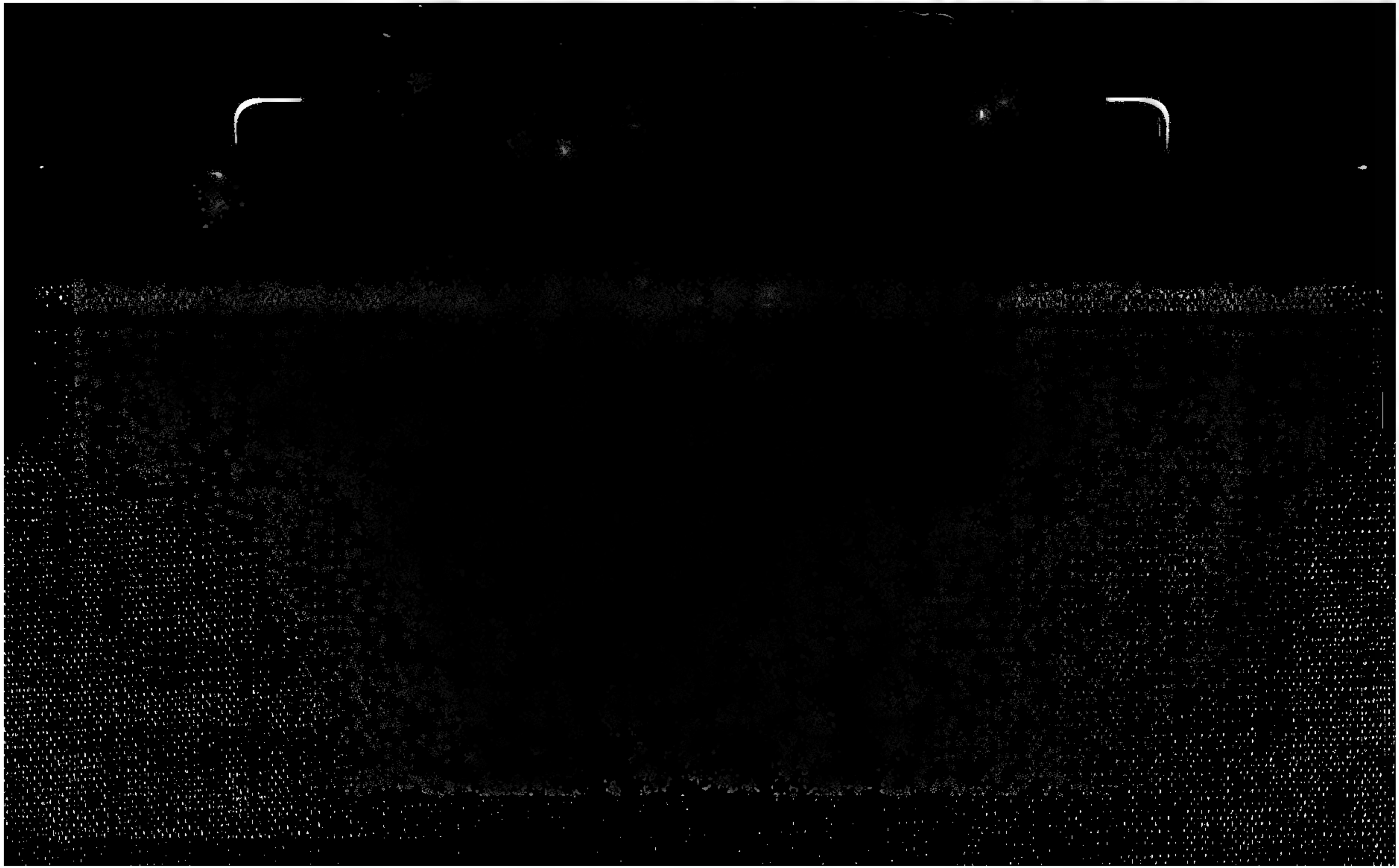

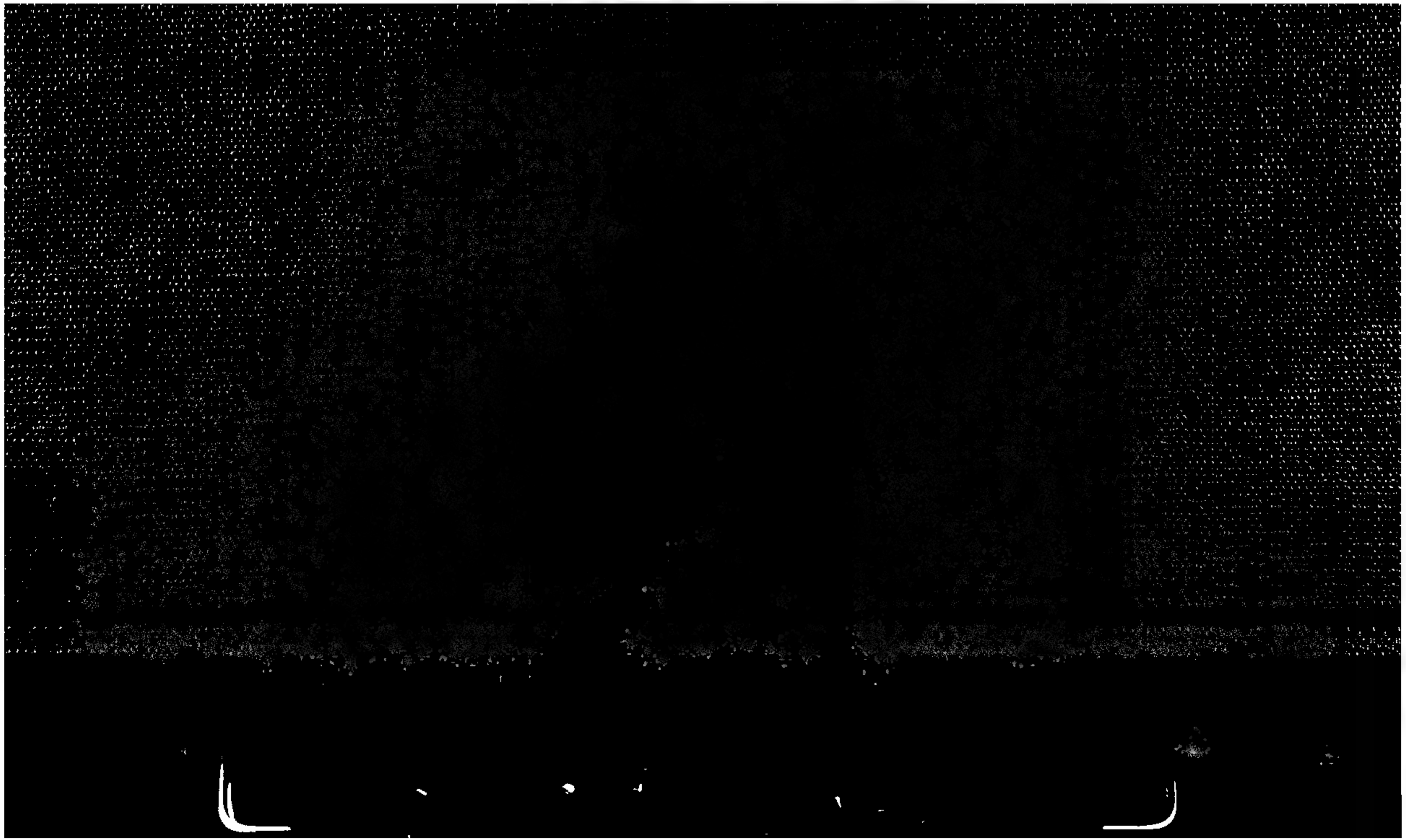

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NOTES, NEWS, AND COMMENT

ACCESSIONS

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THE DOMESTICATION OF CELESTIAL LILIES

The summer of 1931 was noteworthy for the rediscovery of two bulbous plants, both members of the iris family.

The circumstances leading to and connected with these rediscoveries were recorded in some detail in two numbers of this JOURNAL under the titles "Bartram's Ixia coelestina rediscovered"[1] and "Celestial Lilies."[2] In these records the history and distribution, and the habits of the plants in their native haunts were described. Since then we have grown these plants under glass at the Garden and thus have had a chance to observe them and their habits more closely.

Outstanding peculiarities connected with and exhibited by the plants in question are their innate seasonal and diurnal flowering schedules, and seemingly their skillfully planned elusive habit, or the plants' apparent ability to escape detection in their native haunts by botanists.

As the specimens at the Garden that flowered this year represent the first cultivated plants, either under glass or in the open, an intimate description of the circumstances may be of general interest to both the professional and lay plant-man.

A few bulbs collected in the field by the writer were brought to the Garden last year. They were planted in large pans at the Propagating House in the autumn of 1931. These sprouted in due time, the *Salpingostylis* in early spring, the *Nemastylis* in late summer.

[1] Jour. N. Y. Bot. Gard. **32**: 155–161. 1931.
[2] Jour. N. Y. Bot. Gard. **32**: 260–269. 1931.

After the primary leaf and the flower-stalk with its terminal flower-spathe, in each case, appeared, an almost continuous vigil for the opening of the flower was kept, especially after the violet tip of the perianth protruded from between the bracts of the spathe. In its native haunts *Salpingostylis* flowers daily only from just after sunrise to about eight o'clock in the morning. We had planned to photograph and to paint the flower for publication in *Addisonia*. Early rising was obviously necessary in this case. The undersigned's associate in iris studies consequently left home, down in the city, at four o'clock A. M. daily for a period of over two weeks, yet the plants did not flower. Then, one evening he was called out of town for a day. The following morning the specimens in one of the pans opened their flowers! However, the plant did not elude us. By previous arrangement the watchman at the Propagating House notified the writer over the telephone between five and six o'clock. The writer called the photographer to the scene at six o'clock, and photographs were secured, and also color records for the painting. The change of latitude and the difference in the amount of daylight did not seem to change the diurnal schedule of the plant.

The sunrise watch, however, was not abandoned. Further studies of the plant were desired. Another group of specimens had already shown signs of flowering when the first group was photographed. The reward came after a week's period of daily morning visits to the Propagating Houses, and more photographs were secured.

Our intense vigil was discontinued for between two and three months—then back to the task, but on a different diurnal schedule. In its native haunts *Nemastylis floridana* flowers only from four to six o'clock in the evening. After the primary leaf and flower-stalk with its terminal spathe appeared, the purple tip of the perianth began to protrude from between the bracts of the spathe. Then a close watch was maintained. This time no early rising was necessary. However, a daily noon observation was the routine. As in the case of *Salpingostylis* the plant seemed

FIGURE 1. *Nemastylis floridana.* The inflorescence on the left shows the flowers, natural size. The inset to the right shows the habit of the plant, more than twice reduced. Specimens vary much in size, the stems ranging from a foot to five feet tall. (Photograph on opposite page.)

(Figure described on opposite page.)

FIGURE 2 *Salpingostylis coelestina.* The large flowers show the perianth, natural size. The small inset shows the habit of the plant as it grows in the turf of the flat woods.

bent on frustrating our attempts to photograph and paint it. Furthermore, the first flower bud remained stationary for several weeks and finally refused to open, withered and dried up. In the meantime a second terminal bud and two lateral ones appeared, but after showing the colored tip of the perianth remained almost stationary for about two weeks. The daily vigil had become a monotonous routine when one afternoon about one o'clock a message came from the Propagating House to the effect that the *Nemastylis* was about to open its perianth. Our long wait was well rewarded, for three flowers, instead of one, opened to allow us an exceptionally good record by the camera and color records for the painting. It will be noticed that the change in latitude and different amount of daylight seemed to affect the flowering schedule of the *Nemastylis,* for the perianth unfolded much earlier than is normal in its native haunts.

The accompanying figures are the first ones to show these two plants, in habit and natural size, introduced into cultivation for the first time in 1932. We predict that it will be a long time, if ever, before any other two showy plants growing naturally almost within sight of the oldest city in Atlantic North America, or two that are so fastidious and chary with their flower schedule, are brought to the definite attention of botanists and to the fold of horticulture within a few months' time.

JOHN K. SMALL.

DOVEKIES IN THE BRONX

Late in November, and after a long continuous heavy rainstorm from the northeast, residents of the Bronx were startled one morning to find strange birds dead or exhausted in the immediate vicinity of The New York Botanical Garden. (The date of the storm was November 18–19th.)

In a back yard on Carpenter Avenue, one "little auk" was brought into the house of a friend and though offered food could not survive after a twenty-four-hour stay. Another was picked up dead in the Botanical Garden. Though it proved to be in excellent condition for a mounted specimen, it was starved, as

were most of the flock blown inland on the gale that raged for over twelve hours. Still another was picked up by a school child, but all efforts at identification of the species failed when exhibited in the school room! A further report was to the effect that several boys in a row-boat on Spuyten Duyvil Creek on November 20th saw some "little ducks" on the water, rowed over to them, captured five by throwing their hats over them, then took them home where they were cooked and eaten.

The Zoölogical Park was headquarters for inquiries and for the delivery of fifteen or more individuals overtaken by the storm, and reports kept coming in of the number of birds seen or picked up from various parts of New Jersey, Staten Island, and towns dotted along the Long Island shore line.

Great interest attaches to this remarkable flight, probably the largest ever recorded for the New York City region. For the past sixty years or more but three similar occurrences mark the appearance of these visitors from the Arctic Circle in any numbers to our shores, and but two records for the Bronx region are given.

Ice-bird, sea dove, Greenland dove, pine-knot or knotty (they are said to be as "tough as a pine knot") are various other names for the dovekie [*Alle Alle* (Linnaeus)].

As winter closes in over the frozen stretches of Iceland, Greenland, Spitzbergen, and Franz Joseph Land, large flocks of this characteristic bird of the Arctic regions have left their breeding grounds, and, keeping well to the open sea, where assured of a more abundant food supply, travel southward slowly, one stream appearing off the western coast of Europe and as far south as the Canary Islands, the other along the coast of eastern North America.

Atlantic voyagers are sometimes afforded the sight of many diving, pattering on the surface of the sea, or flying with quick wing-beats close to the waves. Dr. Robert Cushman Murphy tells of the large numbers noted in approximately the mid-Atlantic, on the northern route, during the first week of February, 1932.

Since their food is made up of marine organisms and some seaweed and is secured by diving, their enforced stay on land is fatal.

Small birds, measuring just about eight inches in length, we see them here only in their winter plumage: white underparts, a sooty-black head, wings, back, and tail, with white streakings and

FIGURE 1. The dovekie found on Carpenter Avenue, The Bronx, by Miss Christine Nilsson who presented it to Miss Lunt. The bird is in unusually fine plumage.

bar on the wings and usually a small white spot over the eyes. The feet are webbed, the wings rather long and narrow.

The life history of this little bird so important to the Eskimo is unique: no nest is built, and the single egg is deposited in a rock cavity or crevice of the talus slopes. Rarely two eggs are laid, and the breeding range extends as far north as the 78th parallel of latitude.

In spite of their tameness on land and in the face of many enemies besides man, the abundance of the bird seems assured. Nesting in vast colonies, the bird forms an important part of the ecology of the country and aids in sustaining the balance of nature in the far north.

As Mr. W. Elmer Ekblaw tells us in his account of the Crocker Land Expedition—

"They furnish the food for the many foxes of this region (shores of northwestern Greenland); without these birds the foxes would be so few that the natives could not secure adequate clothing, and these 'Arctic Highlanders' could not have persisted here as the most northern people of the world. No trading station would have been established by the Danes; one of the chief incentives to some of Peary's and other expeditions of the coast would have been missing. The grass slopes about the rookeries, the luxuriant herbage being due to their dung, support the largest numbers of hare and ptarmigan, and probably afforded the richest pastures for the caribou before the introduction of firearms effected their extermination from some of the areas along the coast. The burgomaster gull and the gyrfalcon feed upon the dovekie throughout the summer and rear their young upon them too. The fox, burgomaster gull, and gyrfalcon are the chief natural enemies of the dovekie; in addition, the Eskimo, the raven, and perhaps some of the water animals prey upon the birdlets; the whitewhale, so the Eskimo says, catches and eats many. The fox preys not only upon the bird but upon the eggs as well."

Tribes of Eskimos would long since have been wiped out; the eggs are gathered as well as great numbers of the birds, which are eaten raw while still warm, and a dovekie shirt made of the feathered birdskins is a necessary adjunct to the welfare of the community.

To quote from Captain Donald B. MacMillan, in speaking of their return in the spring, a sign as welcome as our own blue-bird—

"But what is that great, pulsating, musical note which seems to fill all space? Now loud and clear, now diminishing to a low hum, the sound proclaims the arrival of the true representative of the bird-life of the Arctic, the most interesting and most valuable of all, the bird which means so much to the Smith Sound native—

the dovekie. . . . The long dark winter has at last passed away. The larder open to all is empty. The sun is mounting higher into the heavens day by day. Now and then a seal is seen sunning himself at his hole. The Eskimos are living from hand to mouth. And then that glad cry, relieving all anxiety for the future, bringing joy to every heart, 'Ark-pood-e-ark-suit! Ark-pood-e-ark-suit!' (Little auks! Little auks!)."

HELENE LUNT.

THE GARDEN'S COLLECTION OF HISTORICAL MICROSCOPES

It is not generally known that The New York Botanical Garden has, in its Museum Building, an interesting collection of old historical microscopes. For many years the collection was in the laboratories of the Museum, where it was not readily accessible to the public. Recently it has been removed and placed in exhibition cases on the second floor adjoining the mycological exhibits.

The instruments have been properly labeled and an extensive series of notes, embracing the data available, is on file and may be consulted by interested students. Arrangements may also be made for close study of the collection by request to the Director.

The basis of the collection was the gift of twenty instruments made over thirty years ago by the late Charles F. Cox, until 1912 a member of the Board of Managers. Fifteen of these are of eighteenth century make, some as early as 1740, while the others are of a later period, ranging to about 1840. They are all originals, not replicas, and represent progressively the advance of the optician's art during the one hundred years. Since the Cox gift, the collection has been increased by a number of instruments of later dates, which were presented by several friends.

This is probably the most extensive collection of antique or historical microscopes in the City of New York, and it should be made the nucleus of a larger one. Collections of this kind become increasingly valuable as the years pass by, particularly to those

interested in the optical and mechanical development of the microscope, and the more comprehensive the collection is, the more important it becomes. The plea is therefore made to microscopists, who may have instruments useful only in a historical sense, to add them to this collection. The fact that it is so rich in the earlier models, which are now difficult to obtain, is an appropriate argument why it should be enlarged.

Earlier descriptions of the Charles F. Cox microscopes were published in the JOURNAL OF THE NEW YORK BOTANICAL GARDEN for May, 1900, and September, 1902. The following descriptions have been altered slightly, but the same numerical order, from 1 to 20, has been retained. The more recent accessions are numbered from 21 to 28.

No. 1. Microscope composed almost entirely of turned-wood parts and cardboard except a circular porcelain ring which rested upon the base, and was intended to hold the support on which the various parts slide. The base is missing, also the stage. Similar instruments were made by the opticians of Nuremberg, Germany, about 1750.

No. 2. Microscope with wood and cardboard tube, supported by two brass columns on a mahogany base. Has an eyepiece mounted in wood, and an objective lens mounted in bone. Maker and date unknown, but probably of German make and of a period somewhat later than No. 1.

No. 3. Culpepper microscope as figured in George Adams's "Essays on the Microscope," 1787, but with the addition of rack and pinion adjustment. It has five objectives and various accessories in an upright, pyramidal case. Date between 1740 and 1745.

No. 4. Culpepper microscope as made by T. Blunt, of London, and so engraved. It has one eyepiece and a defective objective, but no accessories or case. Date about 1745 to 1750.

No. 5. Culpepper microscope, similar to No. 4, but by an unknown maker and with sliding adjustment only. There is one eye piece and the mounting of an objective, but no other accessories or case. Date about the same as No. 4.

No. 6. John Cuff's microscope substantially as figured in Baker's "Employment for the Microscope," 1753, with five objectives and various accessories, in a pyramidal case. Date between 1744 and 1750.

No. 7. Wilson's hand microscope as made by George Adams. Screw barrel pattern with ivory handle. With six magnifiers and accessories in case. Date about 1740 to 1745.

No. 8. Cuff's (or Ellis's) aquatic microscope, substantially as figured in John Ellis's "Natural History of the Corallines," 1755, but with the addition of the screw-barrel of Wilson's hand microscope. With two objectives and various accessories in case. Probably about the same date as No. 7 or a little later.

No. 9. Jones's "Improved Compound or Double Microscope," essentially as figured in Adams's "Essays on the Microscope," 1787. May be used either as a simple or compound instrument. With Martin's revolving disc of six magnifiers and accessories in a pyramidal case. Date about 1785.

No. 10. Microscope, after the Jones model, made by Chevallier of Paris, as engraved on the body-tube. Probably the finest example of the optician's art prior to the advent of the modern achromatic instrument. The stand has a folding tripod base, rack and pinion motion to the stage, five objectives, and numerous accessories in a handsome mahogany case. Date about 1825 to 1835.

No. 11. Small simple and compound microscope made by Cary of London. Supported by a post which screws into the cover of the case. Rack and pinion adjustment to the stage and a compound body with one eyepiece. With three objectives and various accessories in a small case. Date about 1817.

No. 12. Compound microscope, evidently of French manufacture, and perhaps by Charles Chevalier. The stage is supported between two columns and has rack and pinion movement. There are two objectives with some accessories, all in a mahogany case which supports the instrument as a base. Date about 1825 to 1840.

No. 13. Jones's "Most Improved Compound Microscope," made by W. & S. Jones of London. Originally figured and described in Adams's "Essays on the Microscope," 1798, and the model from which Nos. 10 and 16 of this collection were copied. It has Martin's revolving disc of six magnifiers, four objectives, all the accessories catalogued by Adams, and several others. All in flat mahogany case. Date about 1797.

No. 14. Drum microscope, like the one described in the *Journal of the Royal Microscopical Society*, April, 1899, page 213, the latter supposed to have been made by Benjamin Martin. This type was the model for Fraunhofer's stand (1816) and for the cheap upright French and German instruments which are made to the present day. With six objectives and other accessories in a mahogany case. Date probably between 1800 and 1810.

No. 15. John Cuff's microscope, made by George Sterrop of London. This is a closer copy of the original model as figured and described by Baker, than is No. 6 of this collection. With four objectives and other accessories in a mahogany pyramidal case. Date about 1750.

No. 16. Jones model—maker unknown. Substantially like No. 13 of this collection, although somewhat larger. Not so elaborate, however, as the one made by Chevallier (No. 10). There are nine objectives and numerous accessories in a flat mahogany case. Date about 1800.

No. 17. Horizontal microscope made by Amici of Firenze [Florence], the maker's name being engraved on the tube. This model was copied and modified by the Chevaliers of Paris. Their instrument was hinged so that it could be used in different positions, but the Amici model was fixed and could be used only horizontally. It has an elaborate mechanical stage, five objectives, and numerous accessories, all in a flat mahogany case. Date about 1826.

No. 18. Screw-barrel microscope of the Wilson-Adams pattern, but without any handle or support. It may have been used in connection with some other stand. Date unknown; perhaps as early as 1745.

No. 19. Pocket microscope, of the screw-barrel form, probably of German make. With three lenses and other accessories in upright leather case. Date about 1750.

No. 20. The "New Universal Single Microscope" of George Adams and so engraved. First described and figured in his "Micrographia Illustrata," 1746. With six objectives and a silvered speculum, but no other accessories or case. Date about 1746.

No. 21. Triple demonstration microscope made by Nachet et Fils of Paris. So arranged that three observers may view the same object. There are no accessories, except three eyepieces, and no case. Period about 1850 to 1870.

No. 22. Small student's microscope, named on the base, "American Agriculturist Compound Microscope," distributed about 1875, but the maker unknown. There are two small objectives of the triplet type and one eyepiece, but no accessories or case. Presented by John Hendley Barnhart.

No. 23. Gray botanical microscope as made by Queen & Co., of Philadelphia. A simple dissecting stand with a triple hand magnifier. Date about 1890 to 1900.

No. 24. Small upright microscope of the drum type and probably of French or German make. Date about 1870.

No. 25. Microscope of the large drum type and sold by Benj. Pike's Son of New York City about 1870. There are six objectives of the triplet type, and various accessories, including a polarizer and separate bull's-eye condenser. All pack into a mahogany case. Presented by John Hendley Barnhart.

No. 26. Folding field microscope on three legs, the forward two of which fold back along the sides of the rear one. One eyepiece, but no objectives or accessories. In small mahogany case. Maker

unknown and period about the latter part of the 19th century. Presented by Elizabeth G. Britton.

No. 27. Powell & Lealand achromatic objective of 1/50 inch focal length. The front lens is missing and it is useless for observation. Such objectives are not made any longer, as they were not satisfactory. Date about 1860 to 1870.

No. 28. Large demonstration microscope, arranged horizontally and about five feet in length over all. It was evidently used by a lecturer or itinerant showman to demonstrate the wonders of minute nature. The objects are on a large rotating disc and may be brought successively into view. There are no means for observing other objects than those upon the revolving disc and the magnification is limited. Maker unknown, and the apparatus was made, probably, for the user's particular purposes only. Period latter half of the 19th century. Presented by L. London (see JOUR. N. Y. BOT. GARD. 30: 228. 1929).

ROBERT HAGELSTEIN.

THE ACAPULCO GRAPE

Of the Acapulco Grape (*Vitis acapulcensis* H. B. K.) Standley remarks, in his *Trees and Shrubs of Mexico*, that little is known of the properties of the fruit, but that, because of its large size, it might prove of interest in hybridizing operations. As I collected a fine specimen of the mature fruit, now preserved in formaldehyde in the Economic Museum of The New York Botanical Garden, and as I gave special attention to its edible, or rather inedible properties, the following note will prove of interest, especially to horticulturists.

Having never seen another specimen of the species, I am obliged to depend for its determination on the published description, but this agrees so well that I have scarcely a doubt of its identity.

The specimen was collected on the western slope of Limon Mountain, near Balsas, Guerrero, Mexico. The forest had been largely cut away at this point, in mining operations, so there was no support for the vine, which sprawled widely over the ground. The stem and branches were very stout, and the vine of very robust habit. The young growth was fleshy and succulent, more so than in any other grape that I have seen, the young twigs being

very thick. All the young growth is densely and shortly soft-tomentose and grayish-green. The leaves are very similar to those of *V. coriacea* Shuttlew., of Florida, which is probably the nearest ally. The most notable feature of the species is found in its fruiting characters. The panicles are very large, and peculiar in occurring in series of two or more, so close together as to be in contact, and each smaller than the preceding. More remarkable still is their habit of being borne on the tendrils, as well as in the usual position. The tendrils are very stout and fleshy and much branched, and upon one of them, a series of fruit panicles is often found. The fruits are in contact but not densely crowded. They are of light red color, nearly spherical, and very large, 2.5 cm. in diameter. Their appearance is tempting to a thirsty mountain-climber, but they are very disappointing when one bites into them! "Mucilaginous and sour" is a suitable description. The juice is as thick and slimy as a strong mucilage of gum arabic, and will scarcely run. The acidity is so strong as to be keenly irritant to the tongue, and this in spite of the ameliorating effects of the gum. One wonders what it would do to the mucous membrane if the mucilage were not present. To eat it is out of the question and it would probably be quite disturbing to the stomach if taken in any quantity. It is not improbable, however, that an agreeable and comforting drink might be made of its juice, dissolved in water. Both acid and mucilage are valued for their thirst-quenching properties, and various combinations of them are used in summer drinks by country people. Feverish patients are commonly comforted with flax-seed or elm tea flavored with lemon juice. A preparation of this fruit might be found similarly serviceable.

The possibilities of hybridization are of course very interesting, but no conjectures can be offered as to the value of the progeny.

H. H. Rusby.

A GLANCE AT CURRENT LITERATURE[1]

Two decorative members of the Potato family—the Christmas-berry of Florida and Key West and a Siamese *Solanum,* the seeds of which are used as both condiment and medicine in its native land—are included in the number of *Addisonia* which contains plates 561–568.

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Ratings of 1,400 irises, mostly new ones, are given in the *Bulletin of the American Iris Society* for October. Forty-seven accredited judges of the Society compiled the list.

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"The Relation of Erosion to Vegetative Changes" is the title of a significant article by Hugh Hammond Bennett of the United States Department of Agriculture in the November *Scientific Monthly.* The author's points on the far-reaching and devastating effects of erosion and the need for scientific effort to restrict it are thoroughly illustrated with photographs.

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Elizabeth S. C. McClure writes comprehensively on boxwood in the *Bulletin of the Garden Club of America* for November, giving the habits and habitats, history, use, and care of this decorative shrub.

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Information on peppers for those who wish to grow or use them is contained in Bulletin 193 of the Agricultural Experiment Station at Ames, Iowa, by A. T. Erwin.

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Nursery Disease Notes of the New Jersey Agricultural Experiment Station for November reports a new bacterial disease of rose, affecting especially Souvenir and Talisman. A description is given, to direct attention of growers and pathologists to the disease.

[1] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

"Diseases of Ornamental Plants" by Paul E. Tilford is a well-illustrated survey of the subject, appearing as Bulletin 511 of the Ohio Agricultural Experiment Station.

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Tropical Woods for December 1 contains a description of the wood of *Gleasonia duidana*, a tree belonging to the Madder family, which was collected on Mount Duida by G. H. H. Tate and named in honor of Dr. H. A. Gleason, of The New York Botanical Garden, who contributed the specimen to the Yale collection.

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The *Scientific Survey of Porto Rico*, published by the New York Academy of Sciences, includes in part 2 of volume VIII a supplement to the mycology of the island as published in 1926, by Fred Jay Seaver, Carlos E. Chardon, and Rafael A. Toro; also a revision of the slime-moulds (Myxomycetes) by Robert Hagelstein, Honorary Curator of the Myxomycetes at The New York Botanical Garden; and a detailed treatment of the blue-green algae (Myxophyceae) by Dr. W. L. Gardner, of the University of California.

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Egbert Hans continues his interesting series of articles in the December *Gardeners' Chronicle of America* under the title, "Gardening to Create Pictures." Illustrating his subject with sketches showing the application of the artistic principles he advocates, he tells how to make the large garden fit into the landscape.

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Another interesting series being continued in the *Gardeners' Chronicle of America* is on "Foliage Patterns in the Rockery," taking up plants with different colors of foliage which are suitable for a place among the rocks, and considering also their methods of growth and blossoming. James H. Bissland is the author.

* * * * *

How Mrs. U. G. Speed, of North Carolina, has directed the mountain folk in the harvesting of holiday greens in Biltmore Forest is told by Josephine Laxton in *American Forests* for December. Through careful supervision, enough plants are left to provide crops for years to come—a policy needed wherever greens are collected in the United States.

C. R. Orton has prepared a comprehensive bibliography for the subject of seed-borne parasites, accompanied by a brief introduction describing the nature of several such pests. It is published as Bulletin 245 of the Agricultural Experiment Station of West Virginia University.

* * * * *

A memorial biography of Edward Sandford Burgess, for thirty years professor and head of the department of biological sciences in Hunter College, New York City, has been sent to the library of the Botanical Garden through the courtesy of Mrs. Burgess. Dr. Burgess was a well-known and much-beloved naturalist.

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Chinese gardens, which are classed as works of art rather than of science, in contrast to American gardens, are described in the September *Bulletin of the Garden Club of America* by Teng-Kwei. "Designing the City Garden" is the subject of Rose Greely in the same number.

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"The Gladiolus: Its History, Classification, and Culture" is the title of Cornell Extension Bulletin 231, by Alfred M. Pridham. About 175 varieties are listed and described, and 40 or more are illustrated.

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Simple, practical rules for combating pests on potato plants are given by Brookes Barnes in *New Jersey Gardens* for September. In the October issue, John C. Wister continues his 1931 discussion of lilacs, and Lester Rowntree writes about California wild flowers for eastern gardens.

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A list of wild flowers to grow in the garden, and directions for planting with consideration for the type of soil and amount of sun and shade required, are given in *Horticulture* for Sept. 15.

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"Berried Treasure for the Wild Garden" is the entrancing title of an article in the October *Gardeners' Chronicle of America,* by Katharine Cook Meriwether. She tells of shrubs and herbs for autumn coloring and bird food, all available from nurseries specializing in wild flowers.

The opening editorial in *The Gardeners' Chronicle* for Sept. 24 deals with the importance of root growth and the need for further study of its requirements. New experiments are now being conducted in England, it says, on the relation of temperature, fertilization, and season to the sturdiness of roots, and the possibilities of breeding plants with extra strong root systems.

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That plants require substances for nutrition corresponding to vitamins for animal life is the theory propounded by R. W. Thatcher, President of Massachusetts State College, in *Science* for Sept. 30. Dr. Thatcher hopes to have future research on plant nutrition carried out with this theory in view.

In the same issue, T. H. Morgan of the California Institute of Technology, writing a second article on "The Rise of Genetics," declares the application of genetics to horticulture to be one of the important problems for study in the immediate future.

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Experiments being made in California to show the variability in plants of the same species transplanted to different localities are described in *The Scientific Monthly* for October by H. M. Hale. The author emphasizes the variable strength of some characters according to the heredity of the plant and of others according to its environment.

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Riella, the elusive ruffle-plant, which always seems to disappear whenever it is discovered on any part of the earth, is described by R. A. Studhalter of Texas Technical College, also in the October issue of *The Scientific Monthly.* The plant is of an exceedingly rare genus, belonging to the liverworts, and though it has been located in remote sections of the world, it has been seen but a few times over a number of centuries. Dr. Studhalter found specimens in a stream in the Davis Mountains of Texas.

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Science for October records how a hypodermic needle is being used to pollinate pine flowers in an effort to grow better trees for lumber in less time. Canvas bags with celluloid windows are tied over the female flowers. Pine pollen lives long, and some has been brought from India for hybridizing.

CAROL H. WOODWARD.

DR. SMALL WRITES ON FERNS OF FLORIDA[1]

The richest fern region in America is brought to attention in a new volume, " Ferns of Florida," by Dr. John K. Small, of The New York Botanical Garden. As his previous books and numerous articles in this JOURNAL have indicated, Dr. Small has spent much of his time in the last thirty years doing botanical exploration in Florida. His work has been thorough, and no one is better fitted to handle this subject than he. A clear technical style is combined with readable comments on the history and geography of each plant. Each of the 107 species of ferns and fern-allies described is illustrated, most of them life-size, with enlarged details of leaves and fruiting parts.

Besides the Adder's-tongue family and the ferns proper, of which five families are mentioned, the author includes the Marsilea, or Pepperwort, family, Salvinia and Psilotum families, the club-mosses (Lycopodiaceae), species of which are known to most northerners as ground-pine, Selaginella or Spike-moss family, and Quillwort and Horsetail families. Common names are given in every possible case. The book opens with descriptions of the fern-life characteristic of each section of the state—the pine lands, prairies, woods, hammocks, marshes, swamps, and sand-dunes. Dr. Small points to seven pteridophytes which are restricted to Florida, and describes three which have become naturalized in the state. Of the others, about two thirds are typically tropical ferns.

So much information, clearly expressed, is packed into this seemingly small volume, that it is practical both for the student of botany and for the amateur naturalist interested in Florida.

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

The story of cotton from plant to spool is shown in a new exhibit on the main floor of the Museum Building at The New York Botanical Garden. Cotton bolls are first shown, then miniature

[1] Small, John Kunkel. Ferns of Florida. Pp. iii–viii + 1–237. 107 illus. The Science Press.

bales and samples of raw cotton. Following are fourteen more samples representing as many stages in manufacture, some of them amplified by photographs and diagrams. The exhibit is completed with a display of threads for every purpose, bearing the trade-marks of Clark's O. N. T. and J. & P. Coats, by the makers of which threads the exhibit is donated.

The following visiting botanists have registered in the library during the autumn: Dr. Ivan M. Johnston, Arnold Arboretum; Prof. Geo. P. Burns, Burlington, Vt.; Dr. E. H. Eames, Bridgeport, Conn.; Prof. L. H. Bailey, Prof. H. H. Whetzel, and Mr. S. H. Burnham, Ithaca, N. Y.; Prof. Chas. S. Parker, Dr. D. N. Shoemaker, Messrs. W. W. Eggleston, E. P. Killip, and C. E. Chambliss, Washington, D. C.; Dr. F. W. Foxworthy, Miami, Fla.; René Pomerleau, Bethierville, Quebec; Prof. R. Ruggles Gates, London, Eng.; M. Roger de Vilmorin, Paris, France; Dr. Erling Christopherson, Oslo, Norway, and Dr. N. I. Vavilov, Leningrad, U. S. S. R.

Announcement has recently been made of the organization of the advisory board of managers of the Morris Foundation which will maintain the Morris Arboretum, bequeathed to the University of Pennsylvania by the late Miss Lydia Thompson Morris. To the advisory board of seven members is added an operating committee of five University of Pennsylvania officials and faculty members. This committee includes Dr. Rodney H. True, Professor of Botany and Director of the University's Botanical Gardens, and Dr. Clarence E. McClung, Professor of Zoölogy and Chairman of the Research Committee of the University. The Morris Arboretum includes two adjoining estates, "Compton," in Philadelphia County, and "Bloomfield" in Montgomery County. Together, they comprise about 170 acres. Under the ownership and direction of Miss Morris and her brother, the late John T. Morris, the estates were developed into a garden spot renowned not only for the natural beauty of its location but also for the many rare specimens of trees and shrubs introduced by the Morrises. Mr. Morris was in close touch with the late Professor

Charles S. Sargent, of the Arnold Arboretum, and many of the collections for which the latter institution is famous are more or less duplicated. Notable is the collection of *Crataegus* or Thorn-apples, which is attractive, both when in flower and when in fruit. The collections of Magnolias and Japanese Cherries are also remarkable. The endowment provides for the maintenance of a research laboratory (not necessarily on the estate), lectures, scholarships, the publication of the results of research, and the distribution of plants to the public. Arrangements for the early opening of the arboretum to the public, probably in the spring, are now being made.

Meteorology for December. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: *66° F on the 3rd;* 59° on the 7th; 40° on the 12th; 58° on the 25th; and 62° on the 31st. The minimum temperatures recorded were: 30° on the 2nd; 20° on the 10th and the 11th; *10° on the 17th and the 18th;* 18° on the 21st; and 30° on the 29th. The total precipitation for the month was 1.70 inches. An inch of snow fell on the 10th and 6½ inches of snow fell on the 17th. This was figured as .75 inches of rainfall and is included in the total precipitation for the month. A trace of snow was also noted on the 14th.

Meteorology for the year 1932. The total precipitation for the year was 41.94 inches, including a total snowfall of 8 inches which is figured as equal to .80 inches of rainfall. This was distributed by months as follows: January—3.79 inches, with traces of snow; February—2.45 inches (including .05 inches as melted snow or ½ inch snow-measurement); March—4.43 inches, with traces of snow; April—2.34 inches, with traces of snow; May—3.47 inches; June—3.28 inches; July 2.30 inches; August—2.13 inches; September—2.42 inches; October—5.17 inches; November—8.46 inches; and December—1.70 inches (including .75 inches as melted snow, or 7½ inches snow-measurement).

The maximum temperature recorded for the year was 97° F. on the 2nd of September. The minimum temperature recorded was 10° on the 17th and the 18th of December.

The latest freezing temperature of spring was 31° on the 15th of April. The ice on the middle lake was completely gone on March 1st. The first killing frost of the autumn occurred on the morning of the 4th of November.

morning of the 4th of November
morning of the 4th of November

ACCESSIONS

Museums and Herbarium

17 specimens of mosses from Bermuda, West Indies, and Trinidad. (Given by Miss Eleanora Armitage.)

19 specimens of mosses from Maine. (Given by Mr. W. L. Bacon.)

2 specimens of mosses from the United States. (Given by Miss Caroline C. Haynes.)

3 specimens of mosses from Europe. (By exchange with M. Thériot.)

13 specimens of mosses from Michigan. (Given by Mrs. C. D. Thorpe.)

4 specimens of mosses from Maine. (Given by Mrs. Frank E. Lowe.)

50 specimens, "Musci Americani Perfecti," nos. 176–225. (By exchange with Dr. A. J. Grout.)

1 specimen of moss from Tennessee. (Given by Prof. A. J. Sharp.)

6 specimens of mosses from United States. (Given by Mr. J. F. Collins.)

91 specimens of mosses from the Himalaya Mountains. (Given by the Roerich Museum.)

2 specimens of mosses from Minnesota. (Given by Dr. W. S. Cooper.)

3 specimens of mosses from United States. (By exchange with Mr. E. B. Bartram.)

3 specimens of mosses from Louisiana. (Given by Dr. J. K. Small.)

37 specimens of mosses from Maine. (Given by Mr. J. C. Parlin.)

34 specimens of mosses from United States. (Given by Mrs. J. MacFadden.)

9 specimens of mosses from United States. (By exchange with Dr. A. J. Grout.)

17 specimens of mosses from China. (By exchange with Harvard University.)

47 specimens of mosses from British Guiana. (By exchange with the Carnegie Museum.)

25 specimens of flowering plants from Arizona. (By exchange with the United States National Museum.)

18 specimens of cup-fungi from Canada. (By exchange with Dr. H. S. Jackson.)

37 specimens of cup-fungi from Tennessee. (By exchange with Dr. L. R. Hesler.)

1 specimen of *Plectania coccinea* from California. (By exchange with Mr. H. E. Parks.)

3 specimens of cup-fungi from Canada. (By exchange with Mr. John Dearness.)

1 cotype specimen of *Cenangium balsameum*. (By exchange with the New York State Museum.)

675 specimens of fungi "Fungi Dakotenses." (Purchased from Dr. J. F. Brenckle.)

3 specimens of fungi from Porto Rico and Venezuela. (Obtained from the phanerogamic collection.)

2 specimens of cup-fungi from Washington. (By exchange with Professor J. W. Hotson.)

1 specimen of *Durandiomyces Phillipsii* from California. (By exchange with Mr. S. C. Edwards.)

3 specimens of fungi from Georgia. (By exchange with Dr. J. H. Miller.)

1 specimen of *Peziza sylvestris* from New York. (Collected by Mrs. B. O. Dodge.)

1 specimen of *Sclerotinia Geranii* from New York. (Collected by Dr. Fred J. Seaver.)

1 specimen of *Acaulium albo-nigrescens* from New York. (Collected by Dr. B. O. Dodge.)

1 specimen of *Diorchidium* sp. from Brazil. (By exchange with Dr. H. S. Jackson.)

96 specimens of fungi from Honduras. (By exchange with Dr. J. A. Stevenson.)

193 specimens of fungi from Michigan. (By exchange with Mr. George B. Cummins.)

3 specimens of cup-fungi from Ithaca, N. Y. (By exchange with Dr. C. L. Shear.)

1 specimen of *Paxina fusicarpa* from Pennsylvania. (By exchange with Dr. L. O. Overholts.)

20 specimens of mosses from Washington. (Given by Dr. J. W. Bailey.)

9 specimens of mosses from Trinidad. (Given by Mr. W. E. Broadway.)

11 specimens of mosses from Maine. (Given by Mr. J C. Parlin and Mr. E. M. Pitman.)

7 specimens of mosses from Ontario. (Given by Mr. Karl E. Schedl.)

12 specimens of mosses from New Hampshire. (Given by Dr. Mildred E. Mathias.)

19 specimens of mosses from Michigan. (Given by Mr. A. H. Povah.)

6 specimens of mosses from Ontario. (Given by Dr. E. A. Moxley.)

300 specimens of mosses from Colombia. (Collected by Messrs. Killip and Smith.)

8 specimens of mosses from Michigan. (Given by Dr. G. E. Nichols.)

17 specimens of mosses from the United States. (Given by Mr. K. K. Mackenzie.)

4 specimens of mosses from New Mexico. (Given by Mr. W. W. Eggleston.)

3 specimens of mosses from Panama. (Given by Dr. L. H. Bailey.)

4 specimens of mosses from Trinidad. (Given by Mr. W. E. Broadway.)

16 specimens of mosses from the Arctic. (Given by Captain Robert Bartlett.)

78 specimens of mosses from Hawaii. (By exchange with Mr. E. B. Bartram.)

89 specimens of mosses from British Guiana. (Given by Mr. P. W. Richards.)

12 specimens of mosses from United States. (Given by Stuyvesant High School.)

1 specimen of *Pyrenopeziza atrata* from Missouri. (By exchange with Dr. L. O. Overholts.)

1 specimen of *Calostoma Ravenelii* from Delaware. (By exchange with Mr. G. G. Nearing.)

4 specimens of fungi from Philadelphia, Pennsylvania. (By exchange with Dr. Walker Arde, Jr.)

9 specimens of mosses from Peru. (By exchange with United States National Museum.)

2 specimens of mosses from China. (Given by the Metropolitan Museum, Nanking.)

1 specimen of moss from Cocos Island. (By exchange with Mr. E. B. Bartram.)

255 specimens of flowering plants from Australia. (By exchange with the Botanic Garden, Brisbane.)

86 specimens of flowering plants from Peru. (By exchange with the Field Museum of Natural History.)

107 specimens of flowering plants from New South Wales, Australia. (By exchange with Mr. Albert Morris.)

66 specimens of flowering plants from Brazil. (By exchange with the Catholic University of America.)

100 specimens of flowering plants from Mexico. (By exchange with Mr. H. W. von Rozynski.)

11 specimens of flowering plants from South America. (By exchange with the United States National Museum.)

9 specimens of flowering plants from Argentina. (By exchange with Sr. Angel Cabrera.)

74 specimens of flowering plants from British Guiana. (By exchange with the Royal Botanic Gardens, Kew.)

4 specimens of Ilex seeds from South Carolina. (Given by Mrs. Aline D. Weston.)

16 specimens of flowering plants and ferns from northeastern United States. (Given by Dr. H. M. Denslow.)

800 specimens of flowering plants from the Appalachian region of West Virginia. (By exchange with Mr. Earl Core.)

153 specimens of ferns from Kweichow. (By exchange with the Metropolitan Museum, Nanking.)

124 specimens of flowering plants from British Honduras. (Collected by Mr. W. H. Shipp.)

277 specimens of flowering plants from Philippine Islands. (Distributed by the Bureau of Science, Manila.)

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Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

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THE FLOWERING HABITS OF DAYLILIES

The generic name *Hemerocallis* and the common name "day-lily" recognize and emphasize the observation made by gardeners long ago that the individual flowers of certain of the plants thus named are *day-blooming*.

An early volume (Plantarum seu Stirpium Historia, 1576, by Lobel) definitely mentions the two members of this group of plants then known to European gardeners. One of these plants was called *Liriosphodelus phoeniceus* and Lobel states that the names "Hemerocalis" and "Ephemerum" were commonly applied to this particular plant because of the fact that the fugacious flowers last for scarcely a day. Of the flower behavior of the other type mentioned under the name *Liriosphodelus luteus liliflorus*, the Lemon Daylily of today, Lobel makes no mention.

Fifty-three years later John Parkinson, writing especially of plants in English gardens (Paradisi in Sole, 1629), describes the same two daylilies under the names "*Liliasphodelus phoeniceus*, the gold red Daylilly" and "*Liliasphodelus luteus*, the yellow Daylilly." Of the former he says that the flowers open "but for a day, not lasting longer, but closing at night and not opening again; whereupon it had his English name 'The Lilly for a day.'" Of the other type he states that the flower "abideth blowne many daies before it fade." Later he remarks, "In English we call them both Day Lillies, but the name doeth not so well agree with the last, as with the first, for the causes above specified."

In establishing the modern generic name for these plants, Linnaeus (Species Plantarum, 1753) selected the old appellation *Hemerocallis*, meaning in its Greek derivation *beautiful for a*

day. Of the fulvous daylilies, he knew only the one clon then in cultivation, and for a time he considered it a hybrid, but later he gave it specific rank under the name *Hemerocallis fulva* (Species Plantarum, 1762).

Thus the habit of diurnal flowering observed for the "Gold Red Daylily" in cultivation is responsible for the generic name *Hemerocallis* and for the common name "daylily" as applied to this group of plants.

FIGURE 1. Flowers of *Hemerocallis citrina* are nocturnal. They open shortly before sunset, are fully open during the night, and close early the next afternoon (as shown here), unless the day is cool.

Soon after the introduction into Italy about 1897 of the species which was named *H. citrina*, it was recognized that its flowers are night-blooming. A Japanese book, the Somoku-Dzusetsu (second edition, 1874) had already described, incorrectly, under the name *H. Dumortierii*, a daylily whose flowers open in the evening and close early in the following forenoon. Later, in the third edition of this book, the name for this daylily was

given as *H. minor,* which may also be incorrect. The Japanese names for this plant are given as "Yunsuge," meaning Evening Daylily, and "Matsu yoi-gusa," meaning Waiting Evening Herb. Thus a nocturnal habit of flowering is to be recognized as characteristic of certain members of the genus *Hemerocallis.* There are then nightlilies as well as daylilies, or perhaps one may say there are night-blooming daylilies.

It is the rule for all the daylilies now known that a new set of flowers opens, or begins anthesis, at some time each day throughout the greater portion of the period when a plant is in flower. There are however distinct differences among species and clonal varieties in respect to the hour of the day when the sets open and close and in regard to the length of time during which they remain open, especially in reference to the daily periods of sunlight and darkness. In general there are three main habits of flowering among the daylilies:—(1) the diurnal or day-blooming, (2) the nocturnal or night-blooming, and (3) the extended blooming.

The diurnal habit of flowering is well exemplified in the clon of *H. fulva,* whose flower behavior was so clearly reported by Lobel and by Parkinson. It is now known that this plant is merely a horticultural clon and that it is a triploid variant of a variable species widely distributed in the Orient. To distinguish it from the various other somewhat different daylilies of the same species, the name Europa Daylily is now being used. Its flowers open after sunrise, usually about the time when direct sunlight begins to reach the plants, and these flowers close promptly about the time of sunset and before darkness ensues. There is little deviation from this schedule except that there is some delay in the opening when the weather is cool and cloudy. The diurnal habit is seen also in all the other members of the species *H. fulva* which the writer has observed, and these include the double-flowered daylilies, the clon Maculata, and about 100 individuals from the wild in China and Japan. There are only slight variations among these in the exact time of opening and closing. All are diurnal.

The cultivated clon of a second species of fulvous daylily known as *H. aurantiaca* may be classed as diurnal. The flower buds start to open during the hours before sunrise but they

usually remain semi-open until after daylight. They close somewhat later than the flowers of the Europa Daylily but are usually fully closed by 9 P. M.

The various plants of the species *Hemerocallis fulva* and *H. aurantiaca* bloom in midsummer, when the temperatures are generally high. Of the daylilies which bloom in May and early June, the *H. Dumortierii* is also diurnal. Its flowers usually open after sunrise and they close about dark or soon thereafter, but sometimes the closing is delayed until 9 P. M. or later.

The nocturnal flowering is fully developed in the species *H. citrina,* which blooms during midsummer. The rule is that the sets of flowers open shortly before sunset, or at least before it is dark, remain widely open all night, and close the following morning soon after daybreak. During cool and cloudy weather the flowers remain open during a part of the forenoon or occasionally well into the afternoon.

In what may be called "extended flowering," the sets of flowers often remain open for as many as 30 to 50 hours. This habit is exemplified in the clon of *H. flava* observed by Parkinson and now commonly known as the Lemon Daylily or the Custard Lily. The writer has made observations on the flowering of this daylily at various hours of the day and night over a period of several years.

The Lemon Daylily is among the earliest of the daylilies to bloom in spring. As a rule during days of warmest weather the sets of flowers begin to open in the late afternoon, become fully or almost fully open about sundown or shortly before, and remain expanded during that night, the following day, and until about the following midnight. Cooler weather retards the opening of sets until the following forenoon or midday and if such temperatures continue the flowers may remain open through two periods of daylight and the intervening night. Apparently the sudden advent of cooler weather has a somewhat less retarding effect on the closing of the older set of flowers than it has on the opening of the next set in sequence. As a rule, during the warmer weather there are two sets of flowers open each evening from about 6 until near midnight, and but one set open during the hours of daylight. During periods of unusually low tempera-

tures but sunny days, sets of flowers frequently remain fully open as long as 60 hours or occasionally as long as 72 hours. Thus a large well-established plant of the Lemon Daylily may have a period of blooming which covers several weeks, and during this entire period at least one set of flowers will be open at any hour of the day or the night.

FIGURE 2. Flowers of the Lemon Daylily (*Hemerocallis flava*). A set of flowers (see 1) may remain open and in good condition for two periods of daylight, and thus overlap a newer set (see 2), which is for a time somewhat paler in color.

The extended flowering seen in the Lemon Daylily is a combination of both the nocturnal and the diurnal habits with also some further extension. Under certain temperatures the sets open in the late afternoon or evening almost as for the strictly nocturnal flowering, but the sets continue open throughout the following day and into the night beyond the hour when the flowers of the limited diurnal habit have fully closed.

For plants of the species *H. minor* observations indicate that the general rule is that two sets are open during most of the night, especially from sunset until midnight, and that there is one set open during the hours of daylight.

Several horticultural varieties which have the nocturnal *H. citrina* in their parentage are decidedly nocturnal but somewhat less so than *H. citrina*. Of these Citronella, Chrysolora, Calypso, Gold Standard, and Gold Imperial may be mentioned. Calypso, especially, has an excellent habit of growth, numerous scapes and flowers, and the flowers are of large size, full, and a delicate

FIGURE 3. Plant of the Calypso Daylily. There are excellent foliage and numerous scapes and flowers, but the flowers are night-blooming. Photo taken at midday on a warm sunny day.

pale lemon-yellow. The flowers are fully open in the early evening and throughout the night but they are open as late as midday only when the temperatures are lower than usual or the day cloudy. Such a variety will provide attractive masses of flower color during the evening.

FIGURE 4. Flowers of the Gold Dust Daylily. *A*, at 10 A. M.; *B*, at 2 P. M. A set of older flowers (at 1) and a set of newer flowers (at 2) are open together during the afternoon.

There are several early-season clonal varieties such as Gold Dust, Sovereign, Estmere and Orangeman that are hybrids between the diurnal *H. Dumortierii* and some type with a more extended flowering. The general rule of behavior for these is that the flowers start to open after daylight, begin to close after dark, usually about 10, and are fully closed before the following dawn. When the weather is cool the opening may be delayed until near midday and the flowers may remain open throughout the second day, the entire period of anthesis covering as many as 48 hours. Then there may be two different sets of flowers open on a plant during the afternoon. In this case, the older flowers are for a time darker and more orange in color—a condition also to be observed for the flowers of the Lemon Daylily.

Many of the present horticultural varieties which bloom in summer are complex hybrids which have in their ancestry the *H. aurantiaca* and the *H. fulva,* which are diurnal, and the *H. Thunbergii,* which has somewhat extended flowering. The best of these have a good day-blooming habit. The flowers either open during the night or promptly at daylight and remain open until after dark and even as late as midnight.

The best sorts of daylilies for general garden use are those whose flowers hold form, color, and freshness throughout the hours of daylight and well into the night, even during days of high temperatures. Then the succession of different sets provides flowers day after day over the entire period of blooming. For many such varieties the flowers continue in good condition well into the night, a feature of value where daylilies are used for evening decoration.

It will add to the total display of color which daylilies make in the garden and to their value as cut flowers if new types can be obtained whose individual flowers habitually remain open and attractive for a period of several days. Possibly such types of daylilies will be developed in the future. In the breeding work with daylilies now in progress at The New York Botanical Garden, special study is made of the various hybrids in respect to any extension in the life of flowers.

A. B. Stout.

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BIRDS AND THEIR FOOD HABITS

Some Notes on Fall and Winter Fruits in The New York Botanical Garden and Their Consumption by Birds[1]

It is the opinion of a number of observers that the fall of 1932 witnessed an abundance of fruit on the shrubs and trees of The New York Botanical Garden far in excess of many previous years. Certain it is that with the conditions favorable early in the season, such buds as were advancing with the first warm days saw no check by any later nipping frosts. This applies equally well to the heavy foliage of many species, a condition that was apparent well into the late dry summer.

Following close upon the heels of summer, one noticed the gay, vivid-red fruiting pedicels on the sassafras tree (*Sassafras variifolium*), with their erect blue drupes. This fruit has never been profuse in the Garden, but this season found many trees beyond the New York City region well laden. Perhaps one appreciates all the more a fertile sassafras resplendent with heavy fruit, since it is not an altogether common sight on a ramble early in September. Most fond of this fruit are the veery, eastern robin, catbird, red-eyed vireo, eastern kingbird and bob-white; the latter two species are, alas, no longer visitors, much less residents of the Garden, although both may still be found a short distance to the northwest of us in the sanctity of the Van Cortlandt marsh area.

Just about the same time as the sassafras was ripening, the Japanese yew (*Taxus cuspidata*) was reaching the height of its fruiting splendor. From a decorative standpoint one could scarcely picture a more delightful sight than the one afforded by the numerous berry-like fruits hanging like coral beads from every part of the tree.

There is no accounting for taste in the bird kingdom as measured by human standards of palatability; however, here is a luscious syrupy fruit with which one might ward off starvation (yet is it stated that the seed itself is of a poisonous character),

[1] The data herein referred to are assembled from personal observations, notes from Dr. Arthur A. Allen of Cornell University, and from Biological Survey figures.

that is also included in the menu of some of our migrating feathered friends. Available figures on this species are limited, but certain members of the Thrush family have been noted in its vicinity and some of the Sparrow tribe frequent the shelter of the shrubby planting in the collection of the yews.

If one were fortunate enough to be on the scene at the height of the thrush migration, along the banks of the Bronx River where bends the spicebush, one could see the veery and the gray-cheeked, olive-backed and wood thrushes eagerly devouring the glossy aromatic fruit of this slender shrub. Kingbirds as well as red-eyed vireos also enjoy this food.

However, no one fruit seems to disappear over night, as it were, as rapidly as the mountain-ash. The Garden's collection of about ten trees weighted with the accustomed heavy compound cymes of orange-colored pomes are promptly stripped by on-rushing hordes of robins. In addition, the following birds are also listed as eating the fruit of *Sorbus* species: cedar waxwing, Bohemian waxwing, red-headed woodpecker, Baltimore oriole, catbird, brown thrasher, eastern purple finch, purple grackle, eastern evening grosbeak, pine grosbeak and northern flicker.

The European mountain-ash (*Sorbus Aucuparia*), the Rowan-tree of English literature, is well named: *aucupatio* from the Latin, meaning bird-catching or fowling, referring to the unscrupulous method employed by many Europeans in the past—that of snaring song-birds for pot-pies while the birds were feasting in the trees!

Near the head of the list of fall fruits in popularity among the birds are the various dogwoods, though some of the shrub species early lose fruit that is somewhat scanty even at best. Many of our land birds, including crows, eat dogwood. *Cornus florida,* the flowering dogwood tree, is one of the most attractive of all the fall plants with its wealth of lustrous bright-scarlet clustered "berries" (drupes).

Eighty-six species of birds are recorded as having eaten the fruit of *Cornus,* 23 of these being common eastern birds found at one time or another on the grounds of The New York Botanical Garden. In passing, it is interesting to note that although the many trees of the flowering dogwood in the Garden are early

denuded by flocks of migrating birds, just across the river along the stretches of the Palisades the fruit lingers into the winter. The explanation of this lies in the fact that the west bank of the Hudson is not a direct lane for many of the fall migrating land birds, or at least not in such numbers as we are privileged to record going the length of Manhattan and the Bronx.

And mentioning the Dogwood family one cannot overlook the tupelo, pepperidge, black gum, or sour gum, if you will (*Nyssa sylvatica*). Before full maturity, quantities of this fruit have been gnawed by gray squirrels, and of our eastern birds we find the gray-cheeked and olive-backed thrushes, robin, European starling, purple finch and cedar waxwing enjoying this fare.

Even more birds enjoy fruit of sumach (*Rhus* species), 93 species having been recorded. Among them are 17 of the common eastern birds of our region.

Any species of cherry is always inviting to large numbers of different birds; 74 species are known to feast upon wild cherries The black cherry or wild black cherry (*Prunus serotina*), the late species, as the specific name implies, is still one of the commonest trees in the wilder parts of the Garden. Widely disseminated through the agency of birds, its ripening racemes of tasty fruit are eagerly seized upon by large flocks of southward travelers at the very peak of the fall migration.

One of the best bits of preserving the balance of nature to a nicety lies in the value that accrues from the particular taste of our cuckoos. Festooned in the crotches of the wild black cherry are found colonies of the larvae of the tent caterpillar. Puncturing these seething masses for food, the birds control the spread of these pests, but at the same time they accumulate quantities of hair in the lining of their stomachs! However, a unique provision of nature here asserts itself, for after the lining is entirely covered, the hairs, apparently with parts of the lining itself, are rolled into a ball and ejected; it is said that a new stomach lining then carries on the process of digestion.

Phytolacca decandra, pokeweed or pigeon berry, a rather coarse-looking perennial, is still to be found in the woods or in outlying corners of the Garden. Its fleshy berries disappear early in the season, for the eastern mourning dove, kingbird,

European starling, eastern cardinal, eastern mockingbird, catbird, eastern hermit thrush, gray-cheeked and olive-backed thrushes, eastern robin, and eastern bluebird include it in their bill of fare.

The Rose family, in addition to the genus *Sorbus* already mentioned, furnishes valuable food as well as a seasonal variety in the distribution. There are 38 kinds of birds known to feed on apples of various sorts, among them the eastern ruffed grouse, ring-necked pheasant, eastern purple finch, cedar waxwing, eastern mockingbird, eastern robin, pine grosbeak, red crossbill and eastern hermit thrush.

The Zumi apple (*Malus zumi*), native in Japan, is the smallest of the dwarf species, these being especially desirable if one has in mind planting to attract the birds. The red chokeberry (*Aronia arbutifolia*), the purple-fruited chokeberry (*A. atropurpurea*) and the black chokeberry (*A. melanocarpa*) are eaten to some extent, though the latter shrivels early and drops, while the red continues into the winter. Meadowlarks and brown thrashers are known to partake of this fruit.

For *Crataegus* species, such birds as the eastern ruffed grouse, eastern purple finch and pine grosbeak are listed. An interesting item in connection with this large group is a series of personal observations made in the Botanical Garden at different hours of the day on the Washington thorn (*C. Phaenopyrum*) and the Rochester thorn (*C. durobrivensis*). Both are showy ornamentals, the former with smaller and bright scarlet fruit, the latter with a duller red profusion of fruit. Preference was invariably given the Washington thorn, one tree of which was stripped by the end of October. There was never a time when one would miss seeing eastern hermit thrushes here until the last of their migrating dates. Robins and cedar waxwings spending the winter with us are still enjoying this fruit.

Rosa species are eaten by bob-white and ruffed grouse. Of the cotoneasters, *C. microphylla* and *C. horizontalis*, rock cotoneasters, and *C. Francheti* offered their fruits to various thrushes.

The Olive family last fall was represented by the fringe-tree (*Chionanthus virginica*), the dangling fruit of which was also eaten by thrushes. Another member of the same family, the privet (*Ligustrum* species), has persistent fruit until springtime and is sparingly eaten by birds.

The berries of the holly (*Ilex* species) are consumed by the eastern ruffed grouse, bob-white, yellow-bellied sapsucker, cedar waxwing, eastern mockingbird, catbird, brown thrasher, eastern hermit thrush, robin and bluebird and the ring-necked pheasant.

Viburnums are particularly attractive to brown thrashers, catbirds, robins, and the various thrushes. The Fruticetum last fall was early sought out, and very few fruits remained, after numbers of these birds had passed through, except those of *V. dilatatum.* These remain until late winter, and are certainly not a first choice. The maple-leaved viburnum (*V. acerifolium*) lingers into the winter in our woodlands, supplying a need when there is less variety. The black haw (*V. prunifolium*), the commonest species in the Garden, is a great favorite of the eastern ruffed grouse, yellow-billed cuckoo, eastern purple finch, European starling, rose-breasted grosbeak, cedar waxwing and eastern bluebird, in addition to those mentioned above.

Of the honeysuckle family, the common or American elder (*Sambucus canadensis*) disappears early in autumn, the red-berried or European elder belonging to the summer-fruiting season. Twenty-two species of birds are listed as feasting on species of *Sambucus,* while for *Lonicera* species, bob-white, white-throated sparrow, catbird, brown thrasher, eastern robin, pine grosbeak and northern flicker are reported.

The common matrimony vine (*Lycium halimifolium*) belonging to the Solanaceae, or Nightshade family, is eaten by robins, but the still more common bittersweet or bitter nightshade (*Solanum Dulcamara*) is not eaten to any extent.

The partridge berry (*Mitchella repens*) is eaten by the ruffed grouse. The beautyberry (*Callicarpa japonica*), the only species of the genus in the Garden, has its near relative, the native plant *Callicarpa americana,* listed as food for brown thrashers and mockingbirds.

Winter food for winter birds in the Garden is found in many of the dry seeds of conifers. Some birds, because of the peculiar construction of the mandibles, are enabled to pry open the scales that go to form the cone, while others await the natural opening at the moment when the seed is automatically released before choosing this fruit. Crossbills and grosbeaks will be found visit-

ing the Pinetum in particular, although they are fond of any of the conifers as well as of the ailanthus, maple, or sweet gum. Look for the redpolls on birches and alders and notice the dainty goldfinches swaying on the tops of the sweet-birch (*Betula lenta*) especially.

Pine siskins frequent pitch pines in particular, and will also be found among the spruces, or dining on birches or alders. Bagworms (*Thyridopteryx ephemeraeformis*) infesting a variety of trees, including some conifers, are also included in the diet of redpoll and siskin.

The cheery chickadee with his predilection for the eggs of aphids found about twigs, also eats the seeds of conifers, sumachs, birches and poison ivy.

Our commonest woodpecker, the diminutive downy, also is instrumental in the spreading of the poison ivy, but has a varied diet which includes beechnuts, acorns, and berries and seeds of many kinds.

Growing rampant over the Garden one finds two woody plants from the Orient, the oriental bittersweet (*Celastrus orbiculatus*) and the Japanese rose (*Rosa multiflora*), the spread of which has very likely been brought about through the medium of birds.

The hackberry (*Celtis occidentalis*), one of the most widely distributed trees east of the Rockies, is largely spread through the agency of birds and is still fairly common in the Garden. The yellow-bellied sapsucker, European starling, cardinal, cedar waxwing, mockingbird, brown thrasher, eastern robin and bluebird are active agents.

It is still a moot question as to how much if any of the snowberry (*Symphoricarpos racemosus*) and the coralberry (*S. orbiculata*) are consumed. A catbird lingering through the winter here a season or so ago fairly subsisted upon the snowberry. This and many another plant offer fruit at a season when birds may not be too discriminating. *Phellodendron* (the cork tree of the Orient) and the Japanese barberry (*Berberis Thunbergii*) are examples with fruits that last into the springtime and are then eaten.

HELENE LUNT.

THE LOUISIANA "RED" IRISES: A NEW CONTRIBUTION TO HORTICULTURE[1]

The principal interest of the Louisiana Irises to horticulture lies in two fields: one, the presence of hitherto unknown shades of "red" and "pink"; the other, the blooming season intermediate between the bearded Iris and the Japanese Iris. The wine-colored ones were the first to which attention was directed, and these were different enough from *Iris hexagona* to indicate the presence of a group which could not possibly be the group typified by that species. The group containing *I. hexagona* is distinguished from this group by a zigzag stem, deeply 6-lobed capsule and a much later blooming period. These new groups have an erect, straight stem and the capsules are 6-angled or 6-ridged, never lobed. The Louisiana species pass out of bloom during the first week of May in their native habitat, while *I. hexagona* in Florida is just in full bloom the third week of May.

Those who make the assumption that all of these species are the product of natural hybridization between *I. fulva* and *I. hexagona* have evidently not considered this difference in blooming season. Since 1925, further exploration has brought to light many types of reds, pinks, orange-pinks and oranges hitherto unsuspected in this genus, also three with a strong rose-like scent.

The great variation of these obviously different species was impossible to explain completely by natural hybridization, as there were no similar variations known.

Color was quite evidently of no great importance, so after trying out many kinds of differences, the structure of the crest was found to be the only reliable point of difference. Some other differences have been made use of, such as the shape of the sepals and petals, the shape and toothing of the style-appendages, whether the anthers were exserted or included, and whether the petals were erect or drooping. All of these differences seem unimportant until one carefully studies the plants as they grow. The growing of these at the Garden has brought out differences

[1] Abstract of a paper presented before the Monthly Conference of the Scientific Staff and Registered Students of The New York Botanical Garden, December 15, 1932.

in the foliage and habit, as well as in the capsules, and these differences have always confirmed the differences in crest structure.

The types of crest structure chosen were: 1 -a solitary ridge of yellow, orange, or green; 2—a solitary, apically cleft ridge; 3—a median ridge with one or more parallel bands of a similar color; 4—a median ridge with diverging bands of a similar color; 5—a single apically cleft ridge with a radial zone of the same or a similar color; 6—a single ridge, apically cleft or tapering, with a similarly colored radial or blotchy zone surrounded by a white zone. The last group contains no reds, the nearest approach being a lilac form of one of the species.

I. fulva belongs to a group not mentioned above, which is characterized by the total absence of a crest. One other Louisiana species has no crest, but does have erect, clawed petals and included anthers. For this species another group was made, as *I. fulva* has exserted anthers and drooping, nearly clawless petals.

Within the last two or three years commercial dealers and breeders have taken a great interest in these species and a number of them have been placed on the market at both low and high prices, the price being based on the garden value and color rather than the rarity of the species concerned. We have given all the help possible to these dealers and breeders in identifying their plants, so that there will be no confusion of names or species among those who wish to avail themselves of this help.

The most important angle in breeding, it seems to the writer, would be the self-pollinating of these plants back through enough generations to bring out the original species, if they can be brought out. Field-work in the Mississippi Delta has already brought out the fact that the majority of these plants are reproducing true from seed in colonies far enough separated to indicate that they are stabilized in their present forms, but this does not prove that these are the original or ancestral forms, although some of them may be. The theory that any two of the species now present in the region could produce all the colors and forms of crest found seems untenable in view of the impossibilities of color combinations involved. The producing of any new forms that may be obtainable seems best left to commercial breeders.

EDWARD J. ALEXANDER.

SOME NEW HORTICULTURAL SUBJECTS[1]

Three rather recent plant rediscoveries constitute the new horticultural subjects—an orchid and two bulbous iridaceous plants. These plants flowered at the Garden this year.

Two years ago a plant of *Ibidium,* in leaf only, was brought to me in New Orleans. Sent to the Garden, it grew and flowered the past fall. It turned out to be *Ibidium odoratum,* a species described in 1837 by Thomas Nuttall. The original specimens came from Newbern, North Carolina. This plant is the largest member of the genus *Ibidium* (*Spiranthes*), frequently growing a meter tall. However, the outstanding characteristic aside from the conspicuous large spike of very fragrant flowers is the long flowering season. The spike in question remained in presentable condition for over six weeks. A clump of these plants would make a conspicuous conservatory exhibit in northern latitudes.

The blooming schedule of the other two subjects is as remarkably short as that of the orchid is long. The flowers of the two iridaceous plants are of shades of violet—only white as albinos. Their flowering routine is to be recorded in hours, instead of in weeks as in the case of the *Ibidium.* Plants of *Salpingostylis coelestina* flower only for a few hours just after sunrise, while those of *Nemastylis floridana* flower only for a few hours just before sundown. Thus there is a native bulbous iridaceous plant to entertain either the early-rising botanists and horticulturists or the late-rising ones. Notes on the rediscovery and the habits of these plants were published in earlier numbers of this JOURNAL: —*Salpingostylis* **32**: 155–161, *f. 1, 2; Nemastylis* **32**: 260–269, *f. 2.* 1931. See also **34**: 1–5. *f. 1, 2.* 1933.

JOHN K. SMALL.

[1] Abstract of remarks at the Monthly Conference of the Scientific Staff and Registered Students of The New York Botanical Garden, December 15, 1932.

EXHIBITS OF FLOWERS IN NEW DISPLAY HOUSE

A notable step toward making The New York Botanical Garden of increasing interest to the public has been the opening of a special display house for flowering plants in Conservatory Range I, and making it possible for visitors to enter there as well as by the central dome.

Starting with a magnificent exhibit of indoor chrysanthemums in late October and November, the display has been changed as fast as new flowers have been available. Burnett Brothers contributed some unusually fine astilbes, which remained in feathery bloom for many weeks.

For the Christmas season, poinsettias were made a feature of the display, which included also Christmas cherries, Christmas heaths, lilies of the valley, paper-white narcissus, and the exquisite brown orchids of the genus *Paphiopedilum*. Two tree dahlias, one from Mexico and one from Guatemala, and a number of acacias meanwhile bloomed in the conservatory.

Early January brought a display in subtly blended tones of rose, scented by graceful spikes of Buddleia. For this exhibit Bobbink & Atkins sent a large number of choice azaleas in full bloom. There were also camellias, many primulas, and begonias.

Several newly patented varieties of freesias, which will not be on the market for one or two years, followed this display, and with them white callas, the earliest forced daffodils, winter-flowering stocks, and *Gladiolus tristis,* a small, cream-and-green species, which is heavily scented at night. South Africa, which provides this gladiolus, is the home of many plants on which gardeners depend for winter flowers, a number of which are slated for display during February.

Ornithogalum aureum is a golden star-of-Bethlehem little known in this country. *Felicia Bergeriana* is a brilliant new dark blue daisy. Accompanying it will be another novelty, *Ursinea anethoides,* an orange-colored daisy. *Dimorphotheca Ecklonis* is also a composite from South Africa, the rays of which are white and the center blue.

Two other blue novelties being exhibited are a new variety of *Echium plantagineum* and *Heliophila linearifolia,* a crucifer with a slender succulent stem and rich blue flowers.

A GLANCE AT CURRENT LITERATURE[1]

Cotton Mather, religious enthusiast and pursuer of witches in American colonial days, is revealed as the first observer to record natural hybrids among plants, in "Some Forgotten Records of Hybridization and Sex in Plants, 1716–1739" by Conway Zirkle in *The Journal of Heredity* for November. The article, which points to the first half of the eighteenth century as a period of exceptional botanical activity among the English colonists of the Atlantic coast of America, quotes from a letter of Cotton Mather written in 1716, in which he tells how rows of yellow corn were affected by red- and blue-kerneled corn from adjacent rows, and how gourds planted among a man's squashes so embittered the squashes that they were all unfit to eat. He also made notable observations on the sex organs of flowers.

* * * * *

"In the dispersal of plants over long distances, centuries are but seconds," says *The Gardeners' Chronicle* for December 10, in reviewing Henry N. Ridley's "The Dispersal of Plants throughout the World." The article points to the wind, water, birds, and animals as agents for carrying seeds.

* * * * *

An article in the previous issue of *The Gardeners' Chronicle* (December 3) regrets the passing popularity of the zonal Pelargonium, or bedding geranium, and gives rules, especially for the benefit of younger gardeners, for propagation to keep the plants in bloom all year.

* * * * *

The January *American Home* contains page after page of material indispensable to the amateur gardener and the one who wants to keep up to date. "Let's Start Gardening" is the subject of Theodore Lindquist; "An Old-Fashioned Herb Garden"—Egbert Hans; "It's Time to Plan Your Pool"—William Longyear; "Down My Primrose Path"—Marjorie N. Sulzer; "Winter Protection for Gardens"—Jessie F. Gould; "Plants in Living Rooms"—Marjorie Reid Rodes, and the usual "Garden Facts and Fancies" by Leonard Barron.

[1] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

Victor H. Ries tells how to obtain interesting winter effects in the garden by the selection of certain rock-garden plants, use of evergreens, shrubs with colored twigs and decorative fruits, and planting of the Christmas rose, in *Nature Magazine* for January.

CAROL H. WOODWARD.

SLIME MOLDS ON EXHIBIT

One of the largest collections of Myxomycetes, or slime molds, in the United States has been put on exhibit at The New York Botanical Garden. The specimens were all gathered by Robert Hagelstein, Honorary Curator of Myxomycetes, who is one of the country's foremost authorities on these strange forms of half-plant, half-animal life.

Though collected on Long Island, and most of them within twenty miles of Mr. Hagelstein's home at Mineola, they represent about one half of the species known the world over.

In the animal phase of their existence, the slime molds are a practically colorless, gelatinous mass, which has been called "the only liquid that will run up hill." As it grows, and the nuclei which give it life increase in number, it creeps under bark, or through old wood or leaves on the ground—whatever may be the medium on which a spore has alighted. It crawls up the side of a tree as readily as it spreads on a flat surface. For days it may keep up this animal growth—called "animal" because of the similarity of its simple structure to that of the lowest forms of animal life. Then all of a sudden, sometimes merely over night, it changes. The slimy plasmodium takes on color, develops form, and when complete may be like a collection of tiny puffballs, a soft velvet fringe, a cobwebby mass, a delicate tracery of white, or a miniature garden of almost any form or color one might imagine.

Possibly no other type of plant for the slime molds are probably plants at this stage of their existence -has so much absolute variety of form as these, which represent in their manner of reproduction one of the lowest stages in plant evolution.

NOTES, NEWS, AND COMMENT

With an increased interest in nature study and the subject added to many programs of the public schools, special requests from the School Nature League for available plant material have been met by the Botanical Garden so far as possible. More recently Director Merrill has requested that material be distributed generally to the elementary schools of Manhattan and the Bronx. This was followed by the setting up of a seed dispersal exhibit for the Children's Science Fair held at the American Museum of Natural History in December. The fruits of various trees and shrubs as well as those of some herbaceous plants of the Garden were assembled by Miss Helene Lunt and used to this end.

The Torrey Botanical Club, members of which were influential in founding The New York Botanical Garden, has recently adopted amendments to its Constitution, providing for the establishment of a Council of sixteen members which shall have control of the more important business affairs of the Club. This Council includes *ex officio* the President, Secretary, Treasurer, and Editor, who for 1933, are, respectively, Dr. A. F. Blakeslee, Dr. F. T. McLean, Mrs. R. A. Harper, and Dr. B. O. Dodge. In addition, the following Councilors have been elected: for terms of three years, Dr. N. L. Britton, Dr. F. E. Denny, Dr. M. A. Howe, and Mr. R. H. Torrey; for terms of two years, Prof. M. A. Chrysler, Dr. A. H. Graves, Mr. G. T. Hastings, and Dr. J. S. Karling; for terms of one year, Prof. R. A. Harper, Dr. E. D. Merrill, Prof. E. W. Sinnott, and Prof. S. F. Trelease.

The first meeting of the newly formed Mycological Society of America was held at Atlantic City on December 27, 1932, in connection with the meeting of the American Association for the Advancement of Science. After careful preliminary consideration, *Mycologia,* just closing its twenty-fourth year and heretofore published by The New York Botanical Garden, was unanimously adopted as the official organ of the new society. Under the terms of the contract between the Mycological Society of America and The New York Botanical Garden, the journal will be controlled by an editorial board consisting of a Managing Editor appointed

by The New York Botanical Garden, who will have control of all financial matters relating to the journal, and five members appointed by the Mycological Society of America. One member of this editorial board will be designated by them as the Editor-in-Chief. Dr. Fred J. Seaver, who has edited the journal since 1924, was designated as Editor-in-Chief by the Society during the present year, 1933, and was later appointed Managing Editor by The New York Botanical Garden. It is expected that eventually the Mycological Society of America will take over most of the editorial duties, leaving with The New York Botanical Garden only the business management of the journal.

ACCESSIONS

Museums and Herbarium

100 specimens "California Plants." (By exchange with the University of California.)

77 specimens of flowering plants from the United States. (By exchange with the Missouri Botanical Garden.)

557 specimens of flowering plants from North Dakota. (By exchange with the University of Minnesota.)

1985 specimens of flowering plants from Australia. (Given by the Botanical Garden, Brisbane.)

100 specimens "Flora Czechoslovenica Exsiccata." (Distributed by Dr. Karl Domin.)

13 specimens of flowering plants and ferns from the local flora region. (Given by Dr. H. M. Denslow.)

15 specimens of flowering plants from Mexico. (Given by the American Museum of Natural History.)

5 specimens of grasses from New Jersey. (Given by Mr. H. N. Moldenke.)

31 specimens of flowering plants from Indo-China. (Distributed by Mr. A. Petelot.)

267 specimens of flowering plants from the western United States. (By exchange with the United States National Museum.)

1 specimen of *Dryopteris floridana* from North Carolina. (Given by Mr. J. K. Benedict.)

113 specimens of flowering plants from Tuxpeña, Mexico. (Collected by Mr. C. L. Lundell.)

633 specimens of flowering plants from New Hebrides. (Given by the California Botanic Garden.)

320 specimens of flowering plants from Eastern United States. (By exchange with the Arnold Arboretum.)

247 specimens of flowering plants from Indo-China. (By exchange with A. Petelot.)

208 specimens of flowering plants from the Dominican Republic. (Collected by Mr. E. J. Valeur.)

87 hepatics and mosses from Missouri. (By exchange with the Missouri Botanical Garden.)

157 specimens of flowering plants from Bolivia. (Distributed by Dr. Otto Buchtien.)

132 miscellaneous flowering plants. (By exchange with the University Botanical Museum, Copenhagen.)

377 specimens of flowering plants from Chiao, Shantung, China. (By exchange with the Arnold Arboretum.)

65 specimens of flowering plants from northern Utah. (By exchange with the Missouri Botanical Garden.)

907 specimens of flowering plants from West Virginia. (Given by Mr. Earl Core.)

82 specimens of flowering plants from Minnesota. (By exchange with the University of Minnesota.)

91 specimens of flowering plants from Manchuria. (Purchased.)

172 specimens of flowering plants from the Singapore Botanic Garden. (By exchange with the Singapore Botanic Garden.)

37 specimens of flowering plants from the Revillagigedo Islands. (By exchange with the California Academy of Sciences.)

100 specimens of flowering plants from Australia. (By exchange with the Botanic Garden, Brisbane.

50 herbarium specimens of Liberian trees. (By exchange with the Yale School of Forestry.)

111 specimens of flowering plants from the Philippine Islands. (By exchange with Dr. A. W. Herre.)

463 specimens of flowering plants from Texas. (Distributed by the Missouri Botanical Garden.)

5 specimens of sedges from Florida. (Given by Mr. H. N. Moldenke.)

146 specimens of flowering plants from Asia. (By exchange with the Botanic Garden, Singapore.)

456 specimens of flowering plants from Asia. (By exchange with the Far Eastern Research Institute, Vladivostok.)

709 specimens of flowering plants from the Himalayas. (Distributed by the Himalayan Research Institute.)

304 specimens of flowering plants from Caroline Islands. (Collected by R. Kanehira.)

132 specimens of flowering plants from Australia. (Distributed by the Botanic Garden, Brisbane.)

334 specimens of flowering plants from Kweichow, China. (By exchange with the Metropolitan Museum, Nanking, China.)

220 specimens of flowering plants from Campeche, Mexico. (Collected by Mr. C. L. Lundell.)

2 specimens of box-huckleberry from Pennsylvania. (Given by Mr. H. N. Moldenke.)

260 specimens of flowering plants from Missouri. (Distributed by Mr. B. F. Bush.)

512 species of flowering plants from Borneo and Java. (By exchange with the Botanic Garden, Buitenzorg.)

97 specimens of flowering plants from southern India. (By exchange with the Missouri Botanical Garden.)

100 specimens of flowering plants from Patagonia. (Distributed by Dr. A. Donat.)

155 specimens of flowering plants from Borneo. (Given by Dr. E. D. Merrill.)

95 specimens of flowering plants from Singapore Botanic Garden. (By exchange with the Singapore Botanic Garden.)

57 specimens of flowering plants from Samoa. (Given by Professor Erling Christophersen.)

78 specimens of flowering plants and seeds from the eastern United States. (Given by Mr. H. N. Moldenke.)

450 herbarium specimens from Sumatra.

119 specimens of flowering plants from Singapore. (By exchange with the Singapore Botanic Garden.)

198 specimens of flowering plants from China, (Wulsin III Collection). (By exchange with the United States National Museum.)

100 specimens, "Musci Europaei et Americani Exsiccati." (Distributed by E. Bauer.)

67 flowering plants from South America. (By exchange with the Royal Botanic Gardens, Kew.)

62 specimens, mostly *Carex,* from Europe. (By exchange with Dr. Carl G. Alm.)

41 specimens of flowering plants from Central America. (Distributed by University of Michigan.)

1062 specimens of flowering plants from northern South America. (Given by the American Museum of Natural History.)

100 specimens of flowering plants from Patagonia. (Distributed by Dr. A. Donat.)

1 specimen of *Xanthosma* from Haiti. (Given by Mr. C. H. Arndt.)

50 specimens of flowering plants from Yunan. (By exchange with Dr. H. Handel-Mazzetti.)

258 specimens of flowering plants from Arizona. (Given by the Arizona State Teachers College through Dr. John W. Gillespie.)

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Journal of The New York Botanical Garden, monthly, containing notes, news, and non-technical articles. Free to members of the Garden. To others, 10 cents a copy; $1.00 a year. Now in its thirty-fourth volume.

Mycologia, bimonthly, devoted to fungi, including lichens; $5.00 a year. Now in its twenty-fifth volume. Official organ of the Mycological Society of America.

Addisonia, quarterly, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Subscription price, $10.00 a year. [Not offered in exchange.] Now in its eighteenth volume.

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Memoirs of The New York Botanical Garden. Price to members of the Garden, vols. I–VI, $1.50 per volume; to others, $3.00. Vol. VII, $2.50 to members; to others, $5.00.

Vol. I. An Annotated Catalogue of the Flora of Montana and the Yellowstone Park, by Per Axel Rydberg. ix + 492 pp., with map. 1900.

Vol. II. The Influence of Light and Darkness upon Growth and Development, by D. T. MacDougal. xvi + 320 pp., with 176 figures. 1903.

Vol. III. Studies of Cretaceous Coniferous Remains from Kreischerville, New York, by A. Hollick and E. C. Jeffrey. xiii + 138 pp., with 29 plates. 1909.

Vol. IV. Effects of the Rays of Radium on Plants, by Charles Stuart Gager. viii + 478 pp., with 73 figures and 14 plates. 1908.

Vol. V. Flora of the Vicinity of New York: A Contribution to Plant Geography, by Norman Taylor. vi + 683 pp., with 9 plates. 1915.

Vol. VI. Papers presented at the Celebration of the Twentieth Anniversary of The New York Botanical Garden. viii + 594 pp., with 43 plates and many text figures. 1916.

Vol. VII. Includes New Myxophyceae from Porto Rico, by N. L. Gardner; The Flower Behavior of Avocados, by A. B. Stout; Descriptions of New Genera and Species of Plants Collected on the Mulford Biological Exploration of the Amazon Valley, 1921–1922, by H. H. Rusby; and The Flora of the Saint Eugene Silts, Kootenay Valley, British Columbia, by Arthur Hollick. viii + 464 pp., with 47 plates, 10 charts, and 11 text-figures. 1927.

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Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than one million specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 42,800 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestral subjects.

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Benefactor	single contribution	$25,000
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Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

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A GLANCE AT CURRENT LITERATURE
CAROL H. WOODWARD

PUBLIC LECTURES DURING MARCH, APRIL, AND MAY

NOTES, NEWS, AND COMMENT

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THE BOTANICAL GARDEN OF THE FUTURE[1]

Circumstances have favored me in allowing a broad experience among many of the principal botanical gardens, arboreta, and private plant collections of Europe and the United States. Indeed, in the case of several of the largest of them I have been lucky enough to secure quite a close insight into the details of their management and maintenance. For years, therefore, I have been able to collect notes on their various merits or shortcomings, and have given much thought to the problem of widening the scope of the botanical garden as an educational institution. Since by education and training, I am rather a horticulturist and landscape architect than a botanist, I naturally look at the matter from a somewhat different point of view from that of the scientists who are responsible for most of the existing botanical gardens; and I have been led to believe that it might be of general interest if I lay down my ideas in the form of a public article.

I do not propose to criticize anybody or to suggest that mistakes have been made which could have been avoided. It is a change or revision of policy rather which I believe to be desirable for the botanical garden of the future, as I shall outline below. To give serious thought to the botanical garden of the future seems the more appropriate right now, since nearly a quarter of a century has passed during which no botanical garden of any consequence has been laid out in the northern temperate zone, which means that no progress and not much improvement in the design of botanical gardens has been possible for about a generation. On the other hand, those botanical gardens which were started during

[1] Reprinted, with slight modifications, from Parks & Recreation 16: 177–185. Ja 1933.

the last thirty years of world prosperity previous to the World War have now reached such a state of maturity that they permit of an evaluation of the effectiveness of their design and of their serviceability.

Botanical gardens have always been educational, of course, but not in a broad enough sense. They served the scientist and the student of botany rather than the general public. The public was admitted -in European gardens usually for an entrance fee—and it was tolerated but was always regarded more or less as a nuisance. The botanical garden of the future should, I believe, make it its policy to serve first of all the education of the general public. Not that I propose to make a botanist of every salesman and mechanic and to feed infants on Latin plant names. But, with the increased concentration of the population in large cities and therewith unavoidably increased estrangement of man from nature, it seems to me that the botanical garden of the future has a very valuable task to perform by helping the uprooted city dweller to regain or keep a healthful relationship to nature, of which after all he is only a part. Modern man, living in his man-made desert of stone called city, has come more and more to regard plants, trees, shrubs, and flowers, which he sees in the public parks and along the parkways, merely as ornaments. He likes to see them but he does not give them more than a passing thought and is very far from having any feeling of relationship towards them. He breaks and destroys the trees of the roadside in a whim of the moment without knowing what he is doing. He does not have a garden of his own, and, usually, he does not even want one, considering it only as an added burden in which he can see no sense, or as an expensive ornament which he can not afford.

The leaders in public welfare work are many who realize how much of the prevailing restlessness, discontent, and unhappiness is due to this ever-widening gap between man and nature, and public parks, play- and recreation-grounds are generally conceded to be an essential part of every city development. Yet, do any of the city parks change anything in the attitude which the city-dweller has toward nature? They do not, because they do not educate him. I need only to mention Central Park in New York, which suffers so much every year from thoughtless destruction that only at enormous expense can this park be maintained at all.

It seems as if from our forefathers who had to wrest a precarious existence from nature, yet knew well their place in it, we had taken nothing else into our modern, mechanized mode of living than a misunderstood notion of nature having to be conquered by man; which gradually was still further distorted into the childish doctrine that man, *Homo sapiens,* was not a part of nature but rather its supreme master. This attitude, this misorientation of man in nature, is at the root of more evils of city-life than can be outlined here. A change of it, a reorientation, can be effected only by systematic education; and this education must be so simple and its means so attractive and pleasurable that the public will learn without realizing that it is being taught. Here is where the botanical garden of the future would find a field of work of far-reaching importance; in fact, of such great importance that I could visualize a time in which no city of any size would want to be without its botanical garden.

After all, it is the plant life of this globe on which all human and animal life depends, directly or indirectly. To penetrate with loving interest into the whys and wherefors of plant life means to come closer to an understanding of the sources of our own existence. It means to fathom the mysterious oneness of all nature which never loses anything and in which we too find our place. It means to learn that plants and animals are not our adversaries which have to be mastered, nor our tools which are just there for our use, but are just as much a part of nature as we are—our brothers and sisters under the sun. This realization will teach us tolerance and love toward our fellow-beings, whoever they are; and tolerance and love, the children of wisdom, are the parents of happiness and contentment.

Now, let us see in what ways a botanical garden might help modern man to become a better citizen of nature's kingdom, and, therewith, also of his own community.

If it is understood that the policy of a botanical garden is first of all to further or to awaken interest in plant life by the general public, it seems to me that the keystone of the whole problem would be, not just to try to teach people, but to present the material for learning which is displayed in the garden in such a manner that it will make the people eager to learn. We must realize that we are dealing not only with beginners, who, although they know

nothing of the subject, yet are anxious to learn, but with a majority which is quite indifferent toward it. To attract such people and also to hold them, we should consider in particular two points from which a deeper interest in plant life usually takes its beginnings. These are: first, the native flora of the vicinity; and secondly, the flower garden.

Geographical or Ecological Groups

Modern teachers of languages quite generally agree that, to start teaching a language by teaching its grammar, means to render the subject unnecessarily dry and difficult. The grammar will be mastered easily and quite effortlessly after an ear for the language and a feeling for its soul have been developed. The same holds true with the science of botany. If we start teaching botany by teaching taxonomy—which is just as much the skeleton of the science of botany as grammar is the skeleton of a language—we are starting at the wrong end and usually succeed only in killing the interest of most of our students forever. The live end of the science of botany, where we come nearest to its soul, is plant ecology, which teaches of plant associations and their underlying causes, and which therewith takes us right into the heart of nature.

If we can reproduce in a botanical garden in truly natural manner and in large enough samples to assure of a good effect some of the most characteristic types of vegetation of the vicinity, and if we can explain in simple, clear language and in not too many sentences in what way the various plants are adapted to the conditions under which they grow and on which they depend, we shall always meet with deep interest. A babbling brook, a pond, a swamp area, a flowering meadow, and various types of forest associations, stocked with the plants which we meet in woods and meadows of the vicinity, will always attract people, and the information given with such displays will be accepted eagerly. The labeling of the plants in these groups must, of course, be thorough and careful and should supply not only the botanical but also the common name of each variety. Whether any additional information, like, for instance, the origin of the common name and the translation of the botanical name, etc., should be given on the label or rather in a special guide-book, need not concern us here.

To broaden the scope of these ecological groups, some foreign types of vegetation which live under conditions similar to those affecting the native flora might be added. A sample of a Siberian-Manchurian forest and meadow and of Central European forest and meadow would prove particularly instructive, since they would permit of the drawing of interesting parallels and would, in spite of their similarity of appearance, be conspicuously distinct in composition. Besides, it would be possible to show in these three groups, the American, the Asiatic, and the European, a great many plants in their natural environment which in improved forms are the occupants of all gardens.

Since a knowledge of the conditions under which plants grow in nature always gives us the best hints for their treatment in cultivation, it may easily be seen to what a large extent garden culture is applied plant ecology and how the study of plant ecology will lead us without effort to a clearer understanding of the art of gardening. We learn to appreciate the effort it takes to grow beautiful plants successfully, and are easily led into a desire to know by name those plants which interest us, and to understand the differences which distinguish similar ones. The study of their relationships, which is plant taxonomy, is then a natural step forward.

The city-dweller is frequently interested also in the adventive flora of waste lands which he sees so much on the vacant lots of the city. A natural arrangement of the most common cosmopolitan weeds on a small piece of land which is artificially kept in the condition of waste land can be rendered very instructive, if not only the names and the distribution or origin of the plants are given, but, where known, also the history of their introduction. This would offer probably the only attractive way in which these most unattractive plants can be displayed. In the guide-book to the garden a chapter might be included here on the simplest and most effective means of combating weeds in the garden. References to near relatives which are not weeds but are in general cultivation because of their economic or ornamental value would lead again imperceptibly to plant taxonomy.

The Flower Garden

The beauty appeal of the flower garden should, it seems to me, be utilized in botanical gardens to a much larger extent than has

been done heretofore. Large or even complete collections of all the known varieties of iris, peonies, chrysanthemums, gladioli, etc., are, of course, of the greatest importance for horticultural and botanical study, but the general public will stand before such a display only with bewilderment or even with fear. I have often mingled with crowds viewing such plantings to see their reaction. Most frequently the reaction was awe, but not the awe inspired by entrancing beauty which breeds the desire to know more about these plants and, perhaps, to have them in one's own garden, but the awe which uneducated people feel toward something they do not understand and which, they realize, they never will understand.

A few visitors who had come for the special purpose of selecting some good varieties for their own garden were taking notes. Either they filled pages upon pages, since they could not decide which they liked best, or they noted down varieties which took their fancy because of their unusually large or brilliant flowers but which were poor growers or unreliable bloomers.

It has seemed quite evident that the public display of large collections of varieties of one flower does much more harm than good. If the interest of the public is considered, only careful selections of the best and most recommended varieties, tastefully arranged in ideal color combinations, should be displayed. Naturally, in order to make selections one must have collections first. But these should be grown in the nursery or in a special testing field where advanced students might be given permission to view them. As soon as these collections have served their purpose they may be discarded or by gradual elimination diminished, and later on only the newest varieties which come out every year need be grown until they have proven their worth.

Beauty appeal as an attraction on the road to learning should be the motto of every botanical garden and might be applied in particular in the following forms:

The perennial flower garden: Here should be displayed not only attractive combinations of carefully selected best varieties of perennial flowers, but also samples of various kinds of flower borders, such as the spring border, the summer border, the fall border, the continuously blooming border. Furthermore, a selection of the best ornamental flowering plants for shady places: *a*,

those which also stand drought; *b,* those which need moisture. A selection of the perennials which will stand drought in full sun. A selection of the best plants for a green groundcover, *a,* in the shade; *b,* on a dry, hot bank where grass does not succeed, etc. A special corner where newly introduced varieties are displayed might also be included in this garden.

All such selections should, of course, not be considered as permanent and final but must be constantly improved upon or enlarged as further data on the behavior of the various plants under the prevailing local conditions are assembled.

The labeling of such a display garden, which must be very thorough to attain the end in view, is not an easy problem. The labels must be easy to read, yet not so conspicuous that they give a note to the garden which might spoil its beauty. The possibility of doing away with labels altogether and of displaying instead an outline map of the various groups with the names written in seems to be worthy of consideration.

The annual flower garden: This garden also should not display large and bewildering collections of as many different varieties as can be brought together, but rather should show attractive color combinations of a representative selection of some of the best and most recommendable kinds. The selection of varieties in this garden as well as its color scheme should vary from year to year, and a record should be kept of the combinations which have proved particularly pleasing and satisfactory.

The water- and bog-garden: With waterlilies and other water- and bog-plants in stone basins, this may be laid out in such a manner that the various basins are raised two feet or so above ground level or, better still, the paths between them lowered accordingly. Observation of the plants is rendered much easier than when the basins are level with the ground. The so-called sunken garden offers splendid opportunities for the water and bog garden, where one upper path could lead along the basins at foot level, while a lower path on the other side of the basins could bring the plants closer to the eye. If layed out in a formal manner, framed by a planting of tall evergreens, and with the judicious use of Siberian or Japanese iris or other ornamental bog-plants in larger, well-balanced beds or groups, this garden can be made as attractive as it will be instructive.

The natural arrangement of such a collection around a pond, which is frequently preferred, has the following practical disadvantages. First, rare and tender bog-plants, especially of foreign origin, can be given much more careful attention and individual care in basins than in the free bog. Second, the water level in basins can be controlled at will, which is quite impossible in the bog or pond, yet of the greatest importance for the well-being of many plants. Third, half-hardy or tender waterlilies, if in basins, can be grown in tubs which are stored inside during the winter. This is rather difficult in a pond. Fourth, muskrats and turtles show a very annoying preference for rare waterplants which they chew off above the roots. They can easily be kept away from basins, but it is quite difficult to control them in a pond.

The rock garden: Most botanical gardens lay out their rock garden in a natural manner and frequently they achieve very pleasing and attractive results. However, such a natural arrangement has the disadvantage that the best and most desirable varieties lose themselves among the multitude of only botanically interesting species, and it is very difficult for the layman to select from such a planting the forms which are most amenable to cultivation and which will give in his own garden the effect he desires.

There is no reason, of course, why a botanical garden should not have a naturally designed rock garden, as large and elaborate as its funds permit. A separation of the plant collections into American, Asiatic, and European alpines will probably prove most interesting also here. But I believe that beside and beyond that, and in consideration of the recently awakened interest of the general public in rock-gardening, a modern botanical garden should arrange also a special display of the best and most recommendable alpine plants for garden cultivation particularly of the newest improved horticultural forms and hybrids which in so many botanical gardens are missing altogether.

Such a display would for practical reasons as well as for the sake of contrast probably best take the shape of a formal garden, with the plants on raised beds. It should demonstrate good color combinations and groupings, and should show also samples of dry wall and flagstone-path planting. A well constructed moraine bed and dry scree might also be displayed here.

The arboretum: The arboretum offers the following possibilities for garden-like displays:

1. *The rose garden,* which again should contain a selection of the best and hardiest varieties rather than a large collection.

2. *The spring flower garden,* a collection of the most ornamental of the spring-flowering shrubs and trees, perhaps in combination with spring-flowering bulbs.

3. *The autumn garden,* a collection of the trees and shrubs which are outstandingly attractive and ornamental in fruit or in the autumn-coloring of their leaves, perhaps in combination with autumn-flowering perennials. A collection of berry-bearing shrubs which are of importance for bird food in the winter might be included in this garden. The names of the birds which are attracted by the fruits of these shrubs should be given on the label.

4. *The color garden,* a collection of the best of the trees and shrubs with colored foliage, displayed against a neutral background of dark-green evergreens.

5. *The winter color-garden,* a collection of trees and shrubs which are attractive in the winter through their conspicuously colored branches.

6. *The form- or freak-garden,* a collection of the weeping, fastigiate and globe-headed varieties of trees and shrubs. These abnormal forms are always best gathered together in a special group or garden-like arrangement, since, if scattered through the general collection, they invariably spoil the pleasing, park-like effect which without them may easily be obtained. Their study is rendered much more convenient if they are kept to themselves, and, besides, it will be possible then to obtain with them very striking or even grotesque garden effects.

7. *The collection of vines,* which may be arranged attractively on trellises around one of the above gardens.

The general collections of trees and shrubs should be arranged in such a manner that it will be as easy as it can be made to find any one variety one may be looking for. At the same time the aim should be to give the arboretum a pleasing, park-like appearance and to avoid having it look like an orchard or a nursery.

Since for the sake of clearness and to facilitate the study of the plants it seems absolutely necessary to keep all the species of one

genus together, it is desirable, in the interest of appearance, to separate these genus groups clearly from one another by plantings. Where native woods are present, these, of course, will give the best separation, especially if against them and around each genus group a background planting is placed of one particularly satisfactory member of the genus. Where woods are missing, the background planting alone has to serve and will then act also in the valuable function of a windbreak.

Such a background planting around each genus, consisting of one member of the genus, has the further advantage that it will give each group a somewhat finished appearance from the very beginning. Without it the arboretum will look half empty for a long time, since it is sure to take many years before all the species and varieties which are wanted can be brought together, and since ample space must be allowed for each group to make sure that later additions will never lead to a scattering of the collections. With the gradual extention of the collections more and more of this background planting may be removed, to be replaced by plants of additional species or varieties. I suggest, for instance, to surround the oak-group with a background- and shelter-planting of *Quercus borealis,* the maple-group with *Acer rubrum* or *A. saccharum,* the alder-group with *Alnus incana,* the birch-group with *Betula papyrifera*, the spruce-group with *Picea canadensis,* the pine-group with *Pinus resinosa,* etc.

In groups of large genera like, for instance, those named above, a subdivision will increase the clearness of arrangement, and I have always found a separation of the species according to origin into American, Asiatic, and European much more instructive and practical than a grouping according to relationship. There are a few genera, however, like *Cotoneaster* and *Berberis,* in which the species of Asiatic origin are vastly in the majority. In these exceptional cases a grouping according to origin is not feasible and other principles of arrangement, perhaps based on relationship, have to be followed.

Outside of the genus groups which I consider to be necessary I can see no reason for which trees and shrubs in an arboretum should be arranged according to a taxonomic system. It is of much greater importance that each genus be planted in a place where most of its species will find suitable conditions. If planted

in taxonomic sequence, just the opposite will usually be the case. If landscape beauty is considered in the arboretum, as I think it should, a taxonomic arrangement will be found also from that standpoint to be very undesirable.

A number of small genera, of which only one or two species can be grown outdoors, may be brought together in one special group, since, if scattered through the arboretum, they will always be difficult to locate.

Another special group should be made of the trees and shrubs of doubtful hardiness. If these are kept together, they can easily receive any extra care and protection which they may need, and, in case that they should get injured in an abnormally hard winter, they will not disfigure the whole arboretum.

There are four more garden-like arrangements of plants which have to be considered by a botanical garden and which from an esthetic standpoint present very interesting and difficult problems. They are gardens mainly in so far as the plants they display have to be grown in well-defined beds. In general, I believe that in all four of these gardens one has to put beauty considerations in the background and consider clearness of arrangement above everything else.

The medicinal garden: Here might be assembled a good collection of the plants with medicinal properties which are still in official use. A special group of native plants which are poisonous and of which the public must be warned might be included. As a feature of special attraction an ancient herb-garden might be laid out here, containing all the herbs which according to a decree by the emperor Charlemagne were to be grown in every garden of his time.

The economic garden: This garden should contain not only a display of vegetables in various races, demonstrating their relationship and explaining their uses, but also sample plots of the various grain crops, fodder plants, berry shrubs and fruit trees, fiber plants, oil plants, etc.

A feature of great attraction and immense educational value might be suggested for this group in the shape of a vegetable and berry garden on a plot of 50–75 feet which would supply four or five people. In such a garden should be displayed only the most recommendable varieties of each vegetable and fruit in well-bal-

anced quantities and in such a manner that full use is made of the garden all through the growing season. A rotation of crops on the various beds from year to year should also be demonstrated.

The morphological or biological garden: This presents a more difficult problem than the two last-named gardens. The object of its displays, which is to demonstrate the life functions of plants, is of the greatest popular interest, and most botanical gardens which have attempted such displays have done so with the intention of interesting the public. However, in all instances that I have had occasion to observe they have failed utterly in this quest. The public simply will not read a technical guide book, and the displays themselves, as carefully and thoroughly as they were compiled, were too complicated, too detailed, and too intricate to convey any meaning without a thorough study of the guide book.

The only feature that I ever observed as being of general interest was a flower clock which demonstrated the possibility of telling the hour of the day by the opening or closing time of various flowers. The rest of the garden was passed over without even the faintest ray of understanding.

It seems to me that here also the saying can be applied: a little less would have been more, and that in this garden perhaps even more than in any of the others which I have enumerated careful selection of the most essential has to be practised.

It is not at all easy to limit oneself to the most important features in the face of the very wide extent of the field here under consideration and I admit that I have no suggestion for a good solution of this problem. Perhaps the public itself would be the best teacher. It might be possible to develop this garden gradually by starting with only one or two particularly eye-catching features and by adding by and by others which would explain certain problems most frequently puzzling to the public mind. Which these are might be learned from public inquiries which are sure to come in.

At any rate, and especially if a more complete presentation of the subject is desired, it seems to me that this garden should show very clear sectional divisions, each section clearly labeled according to its content, like, for instance: Assimilation, Fertilization, Seed Distribution, etc.

The taxonomic garden: The last I mention is very similar to the biological garden in the problems and difficulties which it offers. If plants which are adapted to very different conditions are to be grown side by side to demonstrate their relationship, they must of necessity have individually prepared beds or even basins. Every bed must be easily accessible to permit the study of the plants; family must be clearly separated from family, and genus from genus, which necessitates a multitude of paths. Even if most of the paths are laid out as lawn paths, they will be prominent; and, since the upkeep of so many lawn paths is very expensive, they are usually covered with gravel; consequently they dominate the whole garden.

Since the size of the families as well as that of the genera varies considerably, and since they have to be grouped together according to their relationship, a formal arrangement which seems to offer the only fairly pleasing solution is very difficult. However, if a compromise on the number of species which are to be displayed can be effected, a formal layout—perhaps with low hedges between the families –should be considered.

Whether one should attempt to display a whole taxonomic system with the majority of its families and genera and a great many species, or whether one might be able to convey a sufficiently clear conception of the principles of plant taxonomy by showing only a few particularly interesting related families, I do not care to propound. Usually the choice of either one method or the other will depend upon the available funds, since the maintenance of such a garden, because of the many individual beds, is very expensive.

The general public, I believe, should not be admitted to the taxonomic garden, mainly because the majority of people will not be interested in it, and their admittance would only cause a noticeable rise in the cost of upkeep. The taxonomic garden should be separated from the rest of the garden by a fence, and special permission to visit it might be given for certain hours to anybody who goes to the trouble to apply for it. The rest of the time this garden should be reserved for student classes.

Besides the above-mentioned arrangements of plants there are various others which might be considered in regions having a suitable climate, like, for instance:

A desert garden, to accommodate those plants which live under arid conditions and demand a maximum of sunlight as well as perfect drainage.

An evergreen garden, to contain a collection of the broad-leaved evergreens which demand partial shade and wind-protection.

A hedge garden. This would have to be strictly formal, and would contain only clipped shrubs and trees to demonstrate which are the most desirable plants for hedges of all types and heights. Since not all of the shrubs displayed here need be grown in hedgerows, but since their suitability might be sufficiently demonstrated by clipping them into cubes, pyramids, or square columns, and since there are also some handsome flowering perennials and, even, some annuals (like *Kochia*) which may be employed for summer hedges, such a hedge display garden with its varying shades of green foliage may be rendered very attractive.

A rhododendron dell, etc.

Perhaps, this program may seem too ambitious for many contemplating the starting of a botanical garden; and it will, certainly, be costly, both to carry out this program in its entirety, and later on to maintain the numerous gardens. Nor should this outline be taken literally, like a recipe. It constitutes an ideal, rather, for which one might strive. How much of it can be carried out in every case, depends mainly on the available funds. However, it is quite impossible to select features without having first an outline of everything that should be considered. Moreover, careful planning for the future will go a long way, as well in the obtaining of funds as in making the best possible use of the funds as they become available. To assist in that was the object of this article.

HENRY TEUSCHER.

A TREE SEDGE

Recently the writer happened on some prints of photographs taken in the island of Andros, Bahamas, during our expedition to that botanically little-known member of the Bahama group in 1909. An account of the results of the trip was published in

FIGURE 1. A lake near the headwaters of Stainard Creek, Andros Island, Bahamas. This and other fresh-water lakes lie between three and four miles from the eastern coast of Andros. There is little or no fresh water on or near the coast. Once a week, early in the morning, native women carry the wash of the settlement, perched on their heads, into these lakes, where the clothes are washed and dried and in the evening carried back to the settlement. A washing party may be seen on the far side of the lake. These lakes are surrounded by very open pinelands and small prairies or savannas. In pineyard, the name used in place of pine land in the Bahamas, and savanna the tree-sedge (*Mariscus jamaicensis*) grew plentifully at the time of our visit to the island in 1909.

this JOURNAL.[1] In this account some of the similarities in structure and vegetation between Andros and peninsular Florida were pointed out. A glance at a map including Florida and the Bahama Islands will show the striking similarity in outline between the eastern part of Florida, or Eastern Florida of the early days, as delimited by the Saint Mary's River and the Suwannee River, and Andros Island. The watershed separating the head

[1] Jour. N. Y. Bot. Gard. 11: 88–101, 1910.

FIGURE 2. A tree of saw-grass (*Mariscus jamaicensis*) in the interior of Andros, Bahamas, where it grows to the greatest dimensions. These plants are most numerous on the savannas where it is too wet for the pine trees and deciduous-leaved shrubs and trees to make normal growths.

waters of the Saint Mary's and the Suwannee is so narrow that the sources of the two rivers almost meet, making what might be termed Insular Florida.

Many genera and species of flowering plants are common to these two regions, not only rare and unusual plants, but common ones and those of wide-spread distribution; for example, poison-ivy (*Toxicodendron radicans*) and Virginia-creeper (*Parthenocissus quinquefolia*).

Among the many species of flowering plants common to the two insular areas is the saw-grass (*Mariscus jamaicensis*). Besides ranging in the Coastal Plain of the United States from Florida to Virginia and Texas and throughout the West Indies, it is one of the common plants of parts of Mexico, Central America, and South America. The largest and most concentrated growth of this much-discussed plant is perhaps in the Everglades of Florida, which are, essentially, a plantation of saw-grass covering about three million acres of prairie. It is the vicious counterpart in lowlands, for inflicting tearing wounds by means of its saw-toothed leaf-edges, of the saw-palmetto (*Serenoa repens*) in the higher lands. Saw-grass is the plant *par excellence* of the Florida Everglades. To the Seminole Indian "The Saw-grass" is synonymous with the Everglades.

The stature of saw-grass varies much according to soil and water, but the maximum development in regard to individual bulk occurs in the interior of Andros Island, as far as the writer is aware.

At the head of Stainard Creek, which flows from the interior of the island out to the Tongue of the Ocean, lies a series of small lakes. About these are pinewoods, known there as "pine-yards," and small savannas. When we were in that region in 1909 trees of saw-grass were scattered over some of these savannas. The plant illustrated (FIGURE 2) shows the average size of a tree of saw-grass. The trunk of this specimen was about one foot in diameter and about four feet high, up to the crown of leaves and flower-stalks. If a palm with a single erect trunk and a crown of leaves is considered to be a tree, we certainly must admit a sedge with the same habit to the arboreous category.

JOHN K. SMALL.

REPORTS FROM STAFF MEMBERS ON THE SCIENCE CONVENTIONS AT ATLANTIC CITY

An increased interest in mycology was noted as an outstanding feature of the meetings of the Botanical Society of America, the botanical section of the American Association for the Advancement of Science, and allied societies, which took place in Atlantic City the last week in December. Reports from those who attended were given at the Monthly Conference of the Scientific Staff and Registered Students of the Garden on January 13.

While Dr. B. O. Dodge observed many new people attending the mycological sessions, Dr. F. J. Seaver remarked that the program offered was the most interesting one of his recollection. This year's convention marked the first annual gathering of the Mycological Society of America, which was formed last year at New Orleans.

Notable papers reported by Dr. Dodge, who gave one himself on new aspects of the life-history of *Penicillium*, dealt with discussions of sex in various fungi, with the idea that the words "male" and "female" should be supplanted by terms indicating self incompatibility rather than absolute sex as it is recognized in the higher plants and animals. The life histories of red algae and of rusts were compared in one of the principal papers.

Dr. Seaver spoke especially of the motion pictures of slime molds which were shown.

Dr. E. D. Merrill, who as retiring chairman of the section of botany, gave an address on "Crops and Civilizations," devoted most of his time to the committee for awarding the annual prize of $1,000 for a meritorious paper, outlining suggestions to be used in the future for the guidance of the committee in making the award. He also took part in a discussion on field methods in the taxonomy section.

"Otherwise, the greatest benefit I derived from the convention in Atlantic City was in meeting various individuals and in discussing matters in which we were interested in common," he said, "and I suppose that after all one gains most at a large meeting of this kind from such special contacts."

Dr. H. A. Gleason told of most interesting studies that have been made in the field of ecology by Dr. George E. Nichols, who

showed photographs of the changes in vegetation of picked spots over a period of years; by Dr. Robert Griggs, who described the advance of the forest around Kodiak, Alaska, in the region of the famous "Land of Ten Thousand Smokes"; and by Professor Paul B. Sears, who gave reports on early vegetation in the United States through his examination of fossil pollen.

Plant physiology was the field which claimed the attention of Dr. Forman T. McLean, and he reviewed briefly papers on the dormancy of seeds, the nutrition of orchard trees, chemical changes in chlorophyll through digestion, the effect of light, moisture, and fire in plant succession in a forest, and the value of mycorrhiza in the nutrition of cedar trees.

A. C. Smith pointed to the emphasis placed on the need for field work, at the taxonomic sessions which he attended. He mentioned especially papers by Dr. E. T. Wherry on stations for the box-huckleberry, by Dr. F. W. Pennell on the genus *Pentstemon*, and by Dr. O. E. Jennings on cryptogams in field work.

Myron P. Backus, a graduate student at the Garden this year from the University of Wisconsin, gave an illustrated report on his studies of the cherry leaf-spot.

A GLANCE AT CURRENT LITERATURE[1]

Among the new booklets on trees in the library of The New York Botanical Garden are catalogs and descriptions of the native trees of southern Florida, northern and northwestern Florida, Alabama, Louisiana, Mississippi, Oklahoma, Maine, and New England, the latter a small volume by Robert Greenleaf Leavitt, published by the Arnold Arboretum. There is also a tiny new booklet entitled "The State Forests of Connecticut."

* * * * *

Trumpet-creepers of the United States and China are the main topic of the Arnold Arboretum *Bulletin of Popular Information* for January 15. Cultural directions are given, with special reference to the variety *Madame Galen*.

[1] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

In "Artificial Light and Plant Growth" recently reprinted by the Boyce Thompson Institute from *Agricultural Engineering*, John M. Arthur warns against overstepping the natural range of solar radiation in choosing artificial light to stimulate plant growth. Infra-red is of no known significance to plants except as it affects temperature, he says, though it can produce a burn, and ultra-violet beyond the limit of sunlight is injurious. Illustrations are given of plants grown under different conditions of light.

* * * * *

"The Respiratory Quotients of Succulent Plants" is a study by T. A. Bennet-Clark, appearing in the September number of *The Scientific Proceedings of the Royal Dublin Society.*

* * * * *

Added to the many biographies of Antony van Leeuwenhoek on the 300th anniversary of his birth is a reprint of an address by Edwin Broun Fred in the January *Journal of Bacteriology.*

* * * * *

Horticulture for January 15 describes Dr. A. B. Stout's new daylily "Taruga," with folded and twisted petals of clear yellow, bearing a very faint and hardly noticeable tinge of fulvous in the midzone. It has a larger flower and blooms later than Wau-Bun.

In the same issue, Edwin C. Powell describes one of the spider-lilies known as Peruvian daffodil (*Hymenocallis calathina*) from which he obtained flowers two weeks after planting the bulbs in Maryland.

* * * * *

The amateur gardener scores in *The American Home* for January. Helen Van Pelt Wilson gives suggestions for the first garden in "We All Want Success from the Start"; Romaine B. Ware tells how to get an early start with annuals; Arthur Hawthorne Carhart writes on "What Size Trees?"; and Adolph Kruhm reveals "How to Select Seeds for Good Vegetables."

* * * * *

"The Ten Commandments of Phlox Culture" are a noteworthy feature of the January *Bulletin of the Garden Club of America.* The issue also contains a review of ancient garden literature, going back before the time of Christ, and nearly twenty pages of "Bermuda Notes" by Mary Helen Wingate Lloyd.

The annual pictorial number of the *Bulletin of Popular Information* of the Morton Arboretum at Lisle, Ill., dated November 21, shows scenes of a place well worth a visit if one is near Chicago. Subject-matter for the photographs was selected by E. L. Kammerer, botanist at the institution, while the pictures were taken by C. E. Godschalk, superintendent. A foreword in the bulletin indicates that this arboretum was established " for practical scientific research in horticulture and agriculture, particularly in the growth and culture of young trees, shrubs, and vines by means of a great outdoor museum arranged for convenient study."

* * * * *

Answering a contention that coconut is the world's most valuable tree, Dr. Willard M. Porterfield, Jr., of St. John's University, Shanghai, writes on "Bamboo, the Universal Provider" in the February *Scientific Monthly*. He points to its great tensile strength, which makes it of value in construction, as well as to its many uses as food, in basketry, and in making musical instruments. He also emphasizes the fact that bamboo reaches its full growth in from 30 to 60 days, sometimes lengthening as much as 90 centimeters in 24 hours.

In the same issue, Dr. Henry S. Conard of Grinnell College writes on plant sociology.

* * * * *

" Tree Immigrants " by Darel McConkey in *American Forests* for January goes far back in history in describing the trees that have been successfully naturalized in the United States. Among those he mentions are the Ginkgo and the Ailanthus, so well known to residents of New York.

In the same number is an interesting series of prize photographs of trees of California.

* * * * *

" A Coldframe House Which Solved One Woman's Problems " is a valuable article by Florence T. Allen in *Horticulture* for December 15. The advantages of the house described, which was built into the side of a hill, were: " Small cost, very early spring activities, a cool spot in which to transplant seedlings during hot days, no fuel bills, no back-breaking work, and no cold raw wind to chill one to the marrow."

The new issue of *Addisonia,* number 4 of volume 7, appearing in December, contains paintings and descriptions of a great variety of showy plants, including *Pitcairnia corallina* and *Chirita lavandulacea,* for both of which cultural directions are given; also several little-known native plants, such as *Hibiscus cardiophyllus,* known as "Tulipán del monte" in Texas and northeastern Mexico, where it grows.

* * * * *

The Gardeners' Chronicle, in its issue of December 24, concludes an illustrated series of articles on *Pentstemon,* by R. B. Smith, of Camla Gardens, East Grinstead, England.

* * * * *

"Testing the New Chrysanthemums" is the subject of R. Marion Hatton in *Horticulture* for January 1. Thirty-four of those considered best are listed.

* * * * *

In outlining the propagation of woody plants, the Arnold Arboretum *Bulletin of Popular Information* of December 28 diagrams the following calendar of activity: January and February, planting seeds inside; February and March, grafting; March and April, pricking off seedlings; May and June, planting the nursery; June to October, care of nursery; October and November, planting seeds outside; November and December, cuttings.

* * * * *

Science for December 30 tells how grooved blocks of peat are being successfully used in place of sand flats in testing the germination of seeds of forest trees.

CAROL H. WOODWARD.

PUBLIC LECTURES DURING MARCH, APRIL, AND MAY

Following is the program of free illustrated lectures to be given during the spring months of 1933 in the Museum Building of The New York Botanical Garden on Saturday afternoons at 3:30. Doors are closed at 3:30; late-comers are admitted at 3:45; lectures close promptly at 4:30.

March 4. "Ornamental Trees and Shrubs," Dr. Forman T. McLean, Supervisor of Public Education.
March 11. "New Garden Flowers," Mr. T. H. Everett, Horticulturist.
March 18. "Billion Dollar Berries," Dr. F C. Meier, Pathologist, Division of Barberry Eradication, U. S. Department of Agriculture.
March 25. "A Paleobotanical Reconnaissance of Cuba," Dr. Arthur Hollick, Paleobotanist.
April 1. "Spring Wild Flowers," Dr. John Hendley Barnhart, Bibliographer and Administrative Assistant.
April 8. "Floral and Scenic Features of the Bahamas," Dr. Marshall A. Howe, Assistant Director.
April 15. "Minute Marvels of Aquatic Life," Mr. Robert Hagelstein, Honorary Curator of Myxomycetes.
April 22. "Sex in the Fungi," Dr. B. O. Dodge, Plant Pathologist.
April 29. "Variegated Plants," Dr. A. B. Stout, Director of the Laboratories.
May 6. "Floral and Scenic Features of Porto Rico," Dr. H. A. Gleason, Head Curator.
May 13. "Travels through the Mountains of Colorado, Wyoming and South Dakota," Dr. Fred J. Seaver, Curator.
May 20. "A Trip to the Philippines," Dr. Elmer D. Merrill, Director-in-Chief.
May 27. "Mushrooms," Dr. William S. Thomas, Physician.

NOTES, NEWS, AND COMMENT

Dr. A. B. Stout, Director of the Laboratories, gave an illustrated lecture on "Daylilies" before the American Horticultural Society in the auditorium of the Interior Building, Washington, D. C., on February 14.

Dr. E. D. Merrill, Director-in-Chief, gave an address on "Systematic Botany and Forestry" at the dedication of the Louis Marshall Memorial Building of The New York State College of Forestry, at Syracuse, February 23.

Dr. Arthur Hollick, Research Associate in Paleobotany, received a medal for "Conspicuous Columbia Alumni Service" from the Alumni Federation of Columbia University in connection with the ceremonies of the annual Alumni Day, held on February 13.

Members of the Executive Committee of the Advisory Council of The New York Botanical Garden visited the Garden on February 2, chiefly to inspect the laboratories and herbaria and to increase their acquaintance with the research work of the institution.

Dr. Marshall A. Howe, Assistant Director, gave a nation-wide radio talk on "Plants that Form Reefs and Islands" over the Columbia Broadcasting System on January 27, as one of the weekly series sponsored by Science Service of Washington. Earlier in this series, Dr. E. D. Merrill gave an address on "Crops and Civilization."

The personnel of the executive and scientific staffs of the Morris Arboretum of the University of Pennsylvania has been announced as follows: Director, Prof. Rodney H. True; Superintendent, Mr. James Lambert; Head Gardener, Mr. James O'Neill; Pathologist, Prof. Harlan H. York; Ecologist, Prof. Edgar T. Wherry; Geneticist, Prof. Conway Zirkle; and Taxonomist, Prof. John M. Fogg, Jr. A general description of the new arboretum and the organization of its advisory board of managers and operating committee may be found under Notes, News, and Comment in this JOURNAL for January.

New photographs of fungous diseases of human beings and living cultures of a number of the causative fungi have been contributed by Dr. Rhoda H. Benham and Mary E. Hopper of the Medical Center for display on the main stair-landing in the Museum Building at The New York Botanical Garden. Such fungi are of importance to the botanist as well as to the physician or dermatologist, not only because they in themselves are plants of a low order, but also because similar forms of fungi have been found to infect higher plants as well as human beings. Studies are now being made showing that even the same fungus may cause disease in either a plant or a person. Among the diseases illustrated in the display are Monilia infection of skin and nails, ringworm of the hand and scalp, "athlete's foot," sporotrichosis, and blastomycosis. Some examples of similar diseases on plants are also shown.

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Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than 1,500,000 specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 42,800 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestral subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

Contributions to the Garden may be deducted from taxable incomes.

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I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ———.

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JOURNAL
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THE INHERITANCE OF FRAGRANCE IN GLADIOLUS SPECIES CROSSES
FORMAN T. MCLEAN

A POTTING-FIBRE MOLD
B. O. DODGE

HARDY ROSES
EDWIN BECKETT

A GLANCE AT CURRENT LITERATURE
CAROL H. WOODWARD

A NEW BOOK ON WEEDS OF THE TROPICS
CAROL H. WOODWARD

TWO NEW BOOKS ON FLORIDA
E. J. ALEXANDER

NOTES, NEWS, AND COMMENT

ACCESSIONS

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JOURNAL
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THE INHERITANCE OF FRAGRANCE IN GLADIOLUS SPECIES CROSSES

There is very little exact information about the inheritance of fragrance in flowers. Most of the breeding work with flowers has been to increase the size or to improve the form, color, or growth habits, and even in roses and violets, where fragrance is an important attraction, apparently very little attention has been given to improving or even retaining this desirable trait. In view of the dearth of data on the subject, the results of some experiments with gladiolus species crosses made with the purpose of introducing fragrance into the garden gladiolus should prove interesting.

The garden strains of hybrid gladioli are generally regarded as scentless, and even the Nanus gladioli used for greenhouse forcing are never sweet-scented, but a number of the wild species of South Africa are fragrant, notably *Gladiolus tristis,* which is strongly scented at night. Several crosses have been made during the past hundred years between *G. tristis* and large-flowered but scentless species and also garden hybrid gladioli. Herbert (1822–47), Colville (1823), Van Fleet in the United States about 1890, Van Tubergen in Holland, and Diener in California recently, all report on hybrids of this species. Colville's red *Colvillei,* and Van Tubergen's Charm, Prunella, and Glow are good examples of the results of these crosses. They are all of slender growth, early-flowering habit, and are intolerant of our hot summers, just as is the parent species, *G. tristis.* They are also scentless and sterile, so they offer little encouragement that a fragrant garden race will ever develop from this use of *G. tristis.* Several crosses made by the author between *G. tristis* and Primulinus hybrid gladiolus

varieties confirm this view. The seedlings resulting, to the number of more than three hundred, were sterile, small and not sweet.

Hybrids raised by Herbert, and reported about 1822, between *Gladiolus tristis* and *G. recurvus,* were apparently sweet-scented, and were named by him *G. fragrans.* From this, *G. recurvus* would appear more promising as a parent, though it is a weak grower and poor seeder. But attempts to cross this species with garden varieties uniformly failed, after repeated trials. Then Herbert's old cross between *Gladiolus tristis* and *G. recurvus* was repeated, using a strong, vigorous form of *G. tristis concolor,* designated as Tristis II, and two forms received as *G. recurvus,* one with bronze-colored flowers and the other violet-colored. The violet-colored strain was raised from seed, all of the seedlings being essentially alike. Since the resulting hybrids or their derivatives might prove valuable as parents for crossing with the garden varieties, it seemed desirable to study the hereditary tendencies in them, even though the number of seedlings, all of which had to be reared in the greenhouse in winter, was necessarily limited. Accordingly, detailed records were kept of all of these hybrids.

Both *Gladiolus tristis* and *G. recurvus* are fragrant, but the fragrance of each is distinct. Tristis has a strong narcissus-like scent, but only at night or after darkening. *G. recurvus* has a more delicate scent, resembling the violet, which is strongest by day. The fragrance of both the first generation, F_1, and the second generation, F_2, hybrids from these species varied in intensity. They were roughly grouped as scentless, faint, or medium-sweet, though in the medium group some were sweeter than others. Since Blakeslee and others have found that people vary greatly in their ability to detect different odors, it may be of interest to record that the same was found to be true here, and that the results given here are entirely based on observations of my own and of one assistant, Miss Helene Lunt, whose perception of the two scents here recorded was approximately like my own.

Some of the results may be found in TABLE 1.

The F_1 hybrids, both of Recurvus bronze, numbering 177, and of Recurvus violet, numbering 90, show strong dominance of the violet day-scent of Recurvus (called R. Day-scent in the table), and as strong recessiveness of the night-scent of Tristis. Among 165 F_2 hybrids, about one third are scentless and two thirds have

TABLE 1

INHERITANCE OF FRAGRANCE IN GLADIOLUS TRISTIS–G. RECURVUS HYBRIDS

	Recurvus Day-scent			Tristis Night-scent		
Tristis II	None			Strong		
Recurvus, both bronze and violet			Medium	None		
	None	Faint	Medium	None	Faint	Medium
F_1 Tristis × Recurvus, bronze	8	59	110	173	0	4
F_1 Tristis × Recurvus, violet	3	17	70	88	1	1
F_2 Tristis × Recurvus, bronze	62	39	64	157	3	5
F_1 bronze × Tristis II	126	22	9	74	23	60

day-scent, while night-scent is again almost absent. In the back-cross of the F_1 to Tristis II, nearly one fifth of the progeny are day-scented, while more than one half are night-scented.

If the presence of day-scent were a simple dominant, then the expected ratios of day-scent to its absence in the F_2 would be 3 : 1, and in the back-cross 2 : 2. On this basis, the day-scent approached expectations in the F_2, but fell far short in the back-cross. On the other hand, if we regard the presence of the night-scent of *G. tristis* as a simple recessive, we should expect it to reappear in one fourth of the F_2, and in one half of the back-crossed hybrids. The night-scent fails to come up to the expected proportion in the F_2, in which the day-scent is well represented, but it fully meets the expected ratio in the back-cross, in which the day-scent has less than half of the expected representation. This relationship might be regarded as indicating a mutual antagonism of the two factors for scent, such that the presence of day-scent in many of the F_2 hybrids might suppress development of night-scent in these individuals, and conversely the presence of night-scent in more than half of the back-cross hybrids might serve to suppress the expression of day-scent in them. The two factors for fragrance, even if they are thus mutually antagonistic, are otherwise independent, not allelomorphs, for a large number of both the F_2 and of the back-cross individuals are entirely scentless, and a very few others have both the day-scent and the night-scent combined in the same individual.

FIGURE 1. A group of *Gladiolus tristis* × *G. recurvus* hybrids.

This apparent antagonism between the two scents in these hybrids may have other causes than purely hereditary ones. The odors are in each case due to aromatic chemical compounds. Dr. Bogert, of Columbia University, very kindly examined the night-scented gladiolus flowers, found they contained a rather unstable aldehyde easily decomposed by light from an ultraviolet lamp, and expressed the opinion that the compound responsible for the odor is either cinnamic aldehyde or a closely related compound. Since aldehydes are easily oxidized, it is entirely possible that the substance responsible for the violet day-scent and the aldehyde caus-

ing the night-scent may under ordinary circumstances react on each other so as either entirely to suppress both odors, or for the more abundant compound to suppress the other. Since heredity must rest in the last analysis on chemical compounds which act as carriers of heredity, it seems reasonable that in some cases the inheritance may be purely quantitative, the unit of amount being the almost infinitely small molecule, the number of which carried in inheritance may be from one to several thousands, or any quantity in between, instead of a small and relatively finite number of genes.

This hypothesis of a quantitative basis of inheritance in certain cases seems best to fit the inheritance of fragrance in the descendants of these two sweet-scented gladiolus species. While the data are recorded as either medium or faintly sweet with each odor, actually the intensities intergrade imperceptibly, from the faintest trace, only noted by the most sensitive and trained nose, to strong odors, sufficient to scent a whole room or greenhouse to a degree noticeable to practically everybody. For instance, while nearly all of the direct crosses between *Gladiolus tristis* and the scentless species and hybrids are properly regarded as scentless, a very small proportion have a barely perceptible fragrance detectable by only a few people. In my experiments, including nearly three hundred such hybrids, about five per cent of them had such barely noticeable odor. So the night-scent of *G. tristis* can be regarded as only relatively recessive, though for practical purposes it is recessive.

Under these circumstances, dealing with magnitudes of fragrance which intergrade into each other, and for which no exact standard of measure is yet available, close analysis of the inheritance ratios would not be significant, even if possible. The general facts: that the day-fragrance is in general dominant, the night-fragrance relatively recessive; that the two may combine in exceptional individuals of the F_1, the F_2, and more frequently in the back-crosses to *G. tristis;* and that entire absence of either fragrance may result in the F_2 generation from all-fragrant parents and grandparents—all of this stands out clearly. They further serve as a practical and reliable guide to future breeding work with these species and hybrids.

Several other traits of the species and hybrids were observed and recorded, besides their fragrance. Fourteen characters other

than odor, in which the two species differ, were quite consistently observed and recorded in the hybrids. The flowers differ in size, *Gladiolus tristis* being two or more inches across, *G. recurvus* about one inch. One and one-half inches is put as the dividing line between large- and small-flowered hybrids. The height of flower stalk also exceeds the length of the longest leaf in *Gladiolus tristis,* but is much shorter than the leaf in *G. recurvus.* The flower segments of *G. tristis* are clear-colored, except for central lines or blotches, while *recurvus* has segments dusted or veined with darker color. The body color of the flower is cream or pale yellow in *tristis,* white in *recurvus.* Similarly, we find an open, flaring shape of flower contrasted with a narrow, bell-shaped one; segments with pointed tips versus rounded ones; narrow segments, less than one-half as broad as long, versus broad segments; plain-margined segments versus wavy-margined ones; upper segments with dark central blotches versus non-blotched ones; clear-colored segment-tips versus lines on the tips; pale throat of lower segments versus dotted throat; greenish lines along centers of throat segments versus no lines; cream-colored anthers versus anthers with dark sides; basal leaf-sheath brown versus sheath dotted green and brown. To find whether there is any apparent linkage between the dominant violet day-scented and any of these characters or the night odor, a count was made of the number of times each character was associated with violet odor, or both characters were absent, and how many times the two characters were independent of each other. Expressing the degree of correlation as a fraction, with the number of agreements as the numerator and the number of disagreements as the denominator, the following are the results:

LINKAGE OF VIOLET ODOR IN SECOND GENERATION GLADIOLUS TRISTIS–G. RECURVUS HYBRIDS

	F_2	$F_1 \times T.$		F_2	$F_1 \times T.$
Flower size		68/75	Segments blotched	81/58	46/107
Cream color	79/70	61/93	Lines on tips	81/72	
Segments dusted	74/65	126/69	Throat dusted	92/75	113/44
Open shape	70/69		Throat lines	87/79	
Tips pointed	84/66		Anthers lined	78/88	
Segments broad	99/64	93/64	Odor at night	61/106	69/88
Segments wavy	73/65	89/65	Height/leaf length	63/102	65/92
			Leaf sheath dotted	89/45	92/62

If there is linkage, it should obviously appear in both the F_2 and in the $F_1 \times$ Tristis. If there is an apparent positive correlation in one set of progeny, and an apparent negative correlation or none in the other set, then the figures cannot indicate any interdependence. The only evident correlations in both sets are violet day-odor with broad flower segments, F_2 99/64 = 62 per cent correlation and $F_1 \times T$ 93/64 = 59 per cent correlation. Also, violet

FIGURE 2. *Gladiolus recurvus,* the violet-scented parent species.

FIGURE 3. *Gladiolus tristis concolor,* the night-scented parent species.

day-odor with height of plant, F_2 63/102 = 62 per cent negative correlation and $F_1 \times T$ 65/92 = 59 per cent negative correlation. Both of these show very weak linkage, if any, of the breadth of segments and shortness of flower stalk with the violet scent. The fact that the degree of correlation is about the same in both cases may be purely accidental, as an attempt to establish a similar correlation between broad flower-segments and short stalk failed.

Theoretically, if the inheritance is carried by the chromosomes, then the number of entirely independent characters of any plant should be limited by the haploid number of chromosomes, which

is found to be 14 in *G. tristis* and related Gladiolus species. Among the 16 pairs of characters here considered, these two sets are the only ones that suggest any correlation to violet odor, and in them the linkage is so weak, if it exists at all, that it need not be seriously considered in further breeding work.

Thus, none of the contrasted characters of the two species need necessarily accompany the dominant fragrance into hybrids with the garden gladiolus varieties. Traits that the species have in common, such as slender growth, requirement of cool weather for growth, etc., may be linked with the character for violet scent. Studies of such hybrids are now being undertaken. From the breeding records, it is already evident to what extent the characters for fragrance are transmitted, and that the two types of fragrance are not linked, either with each other or with the other recorded characters to any great degree. Thus genetic records have proved distinctly valuable in guiding practical breeding work, even with so evanescent a character as flower fragrance.

FORMAN T. MCLEAN.

A POTTING-FIBRE MOLD

Our Pathological Laboratory is frequently called upon to examine specimens of ornamental plants sent in because they were thought to have been diseased or infested by insect pests. Not infrequently these specimens show no evidence of a fungous parasite or insect injury. Cases of gas injury to house plants are very frequent, especially where the kitchen range allows gas to escape. Faulty aëration, watering and potting of greenhouse plants and other bad cultural practices sometimes result in conditions favorable for growth of fungous parasites and infestation by insects, or in conditions which may be mistaken for disease.

FIGURE 1. Base of an orchid, showing fungous growth covering the old potting fibre and orchid roots. The fungus is probably not parasitic. A condition demanding repotting with fresh fibre.

When only a small fragment of a plant is sent in for examination in the latter cases, it is difficult to determine what the real trouble may have been.

A very striking example of a "diseased" condition which may follow from failure to repot plants at the proper time has recently come to our attention. Many plants in an orchid house were growing poorly and some were dying out. These showed a white fungus growing around the base of the plants, frequently reaching up an inch or two on the green parts. The base of the plants sometimes showed decay to such an extent that they were no longer able to maintain an upright position. In some cases the mold had penetrated all through the potting (fern) fibre, completely enveloping the root system, giving a picture like that shown in FIGURE 1. Attempts to cultivate the fungus in pure culture resulted, at first, in failure, as did attempts to produce a diseased condition by inoculating plants directly with clean fungous fragments taken from the base of "diseased" plants.

Since the fungus was able to thrive on the fern fibre alone (FIGURE 2), it was clearly not an obligate parasite. Very likely the damage done was merely the result of suffocation, as the fungus would necessarily deprive the roots of a certain amount of air and moisture, and by rotting the fibre, weaken the plant's support.

It was found that the fungus could be killed by sprinkling Semesan lightly over the exposed fungous growth, but this did not remedy the real trouble. The old fibre had become sour and rotted to such an extent that it could no longer serve its original purpose as a potting medium. The plants showing this moldy condition were therefore repotted, fragments of the old fibre were cleaned off, and the root system was immersed in Semesan for a short time as an additional precaution against carrying over the fungus. Just how long it would be before the fungus would become established again on the fresh fibre is, of course, uncertain.

The old fibre, on testing, was found to be very acid. This gave us the hint as to the proper medium to use in culturing the fungus in the laboratory. An agar medium made up with a decoction obtained by soaking the fibre a few minutes in hot distilled water, gave us a substratum on which the fungus could be grown fairly well and its peculiarities studied.

FIGURE 2 The fungus, *"Ptychogaster,"* growing in a laboratory culture on old fern fibre to the exclusion of all other molds that would naturally develop under such conditions. No mushroom fruiting bodies have been formed to date. Slightly reduced.

The scientific name of the fungus cannot be determined exactly from our material. Although it has been grown for several months on the old fibre and in pure culture in the laboratory, no fruiting bodies have developed. The snow-white mycelium, or "mold," shows *clamp connections* characteristic of members of the mushroom tribe of the Basidiomycetes. The general habit of growth suggests that it may be a member of the form genus *Ptychogaster,* species of which have been occasionally reported in greenhouses and in pine forests. It has also been claimed that certain species of *Ptychogaster* are connected with species of mushrooms such as *Boletus* (*Ceriomyces*) and *Polyporus.* The

fluffy hyphal branches that extend out into the air are very much contorted and spirally twisted, suggesting the peripheral growth of the fruit body of *Pilacre,* one of the Protobasidiomycetes. Further study will be necessary in order to determine its exact identity and to learn just how it was able to become so thoroughly established in the orchid house. No report of a similar invasion has come to our attention.

We have recently isolated several other interesting fungi from diseased orchids found in other greenhouses. A species of *Gloeosporium,* for example, was proved by inoculation to be definitely parasitic, causing the well-known anthracnose condition frequently reported in orchid literature. The identity of our species is uncertain, as no ascocarpic stage has yet developed in our cultures. It is not *Gloeosporium macropus,* however.

A *Fusarium* obtained from leaf spots was proved by single-spore cultures to be the asexual stage of a *Nectria* which developed its beautiful little red fruit bodies in large numbers on orchid leaves inoculated in the laboratory. Species of *Fusarium* are among the most destructive fungi when they grow as parasites, causing damping-off, wilts, and root-rots. Our species is probably *Nectria Ipomoeae* Halsted, a form found not only on sweet potato but also on various other plants. It is not highly parasitic. *N. Goroshankiniana* Wahrlich was originally found on orchid roots. It was claimed to be associated with a *Fusarium* but the connection was not proved. No doubt it is the same as *N. Ipomoeae.*

A *Volutella* and a *Cephalosporium,* found on orchids, are also being studied. A more extended account of this work will be given later in another connection.

B. O. Dodge.

HARDY ROSES[1]

These remarks about hardy roses will apply chiefly to the Hybrid Teas, which are the most popular group. They are also the least hardy, therefore require more attention than the Hybrid Perpetuals and Climbers.

Site: Choose a good open location in full sunshine.

FIGURE 1. Photograph of the Rose Garden at "Ophir Farm," Purchase, N. Y., the estate of Ogden Reid. This illustrates the value of Hybrid Teas as fall-flowering subjects. The photograph was taken on October 6 by Edwin Beckett, Gardener.

Preparation of ground: If possible, take out old soil to a depth of two feet. Break up the bottom; if the subsoil is wet, provide drainage. Replace with good compost, topsoil, and a liberal amount of cow manure and bonemeal. If unable to do this, dig deeply and incorporate well-rotted manure.

[1] Abstract of a talk given by Mr. Edwin Beckett, Superintendent of the Ogden Reid Estate, Purchase, N. Y., on December 3, 1932, at The New York Botanical Garden.

Planting: Space plants at least eighteen inches apart. Plant deeply, covering union of stock and scion at least four inches—a little less if the ground has been prepared previously and allowed to settle. Spread the roots out and firm well. Prune to three or four eyes of the previous year's wood, if spring-planted. Fall-planting, in October, is preferred to spring; the reason for this is that plants obtained in spring have usually been wintered in store-houses, and do not start so well. Fall-planted stock makes good root systems.

Summer care: For insect pests, use nicotine spray. Rose bugs are hard to control. For fungous diseases, mildew and black spot, spray with fungicides every two weeks regularly. Mildew is not difficult to eradicate, but black-spot is. Rely mainly on keeping the plants in good vigorous condition.

Avoid, if possible, pansies and similar material in the bed. Cultivate often, and keep a good dust mulch.

Do not disbud; side flowers prolong the flowering period. Pinching to control the flowering period can be practised. Dead flowers should be removed as necessary, and when the whole truss has flowered, cut it off, but not farther than to the first good leaf-bud.

Winter care: About the beginning of November, hill up the plants with the surrounding soil to a height of six or eight inches. Lightly cover with salt hay or leaves after the cold weather has set in and the ground is frozen. This prevents alternate freezing and thawing, and covering after the ground is frozen prevents injury by mice below the ground. Uncover in spring after the frost is out of the ground. Pruning, in the case of the Hybrid Teas, will consist mainly of removing weak wood, and cutting back to the ground line. Level the beds, and fork in a good dressing of bonemeal.

Hybrid Perpetuals may be pruned lightly if a good bush is preferred, but better flowers are produced when hard pruning is practised. The Ramblers should be pruned after flowering, by removing the canes that have flowered.

Varieties: Good varieties of Hybrid Teas, from an all-around standpoint, are—*pink:* Radiance, Lady Alice Stanley; *red:* Étoile d'Hollande, Red Radiance; *flesh:* Lady Pirrie; *yellow:* Duchess of Wellington.

Among the Ramblers, Mary Wallace, Primrose, American Pillar, Paul's Scarlet Climber, and Silver Moon are desirable.

Rosa Hugonis, an early-flowering single yellow, should find a place in every garden.

EDWIN BECKETT.

A GLANCE AT CURRENT LITERATURE[1]

One of the few botanical studies made in connection with the total eclipse of the sun last fall is published in *Ecology* for January. J. L. Deen and M. H. Bruner report the variation in the width of the stomatal openings in gray birch.

* * * * *

The *National Horticultural Magazine* for January contains a tantalizing article on acacias, which makes one long to have these flowers, which are beautifully pictured, about one all the time. Though the title is "Acacias in California," and the cultural directions given pertain to that state, Katherine D. Jones tells of acacias all over the world and all through history, mentioning species with such names as Wait a-bit, Dead Finish, Raspberry Jam Tree, Kangaroo Thorn, Cyclops, and Golden Wreath.

In the October and January issues, Arthur D. Slavin has written on "Our Deciduous Conifers." Lilian A. Guernsey presented an exquisite series of Calochortus portraits in the July number. Among other worth-while articles has been a series by Alice Miner entitled "The A B C's of Rock Gardening."

* * * * *

The first plants to cover the sterile volcanic ash from Mt. Katmai in Alaska, 18 years after its eruption, were leaf-bearing liverworts, Robert F. Griggs reports in the February *American Journal of Botany.* Certain mosses and seedling willows sprang up next.

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Plants that produce light are described in the *Missouri Botanical Garden Bulletin* for February. Among them are nasturtiums and some mosses.

[1] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

Basil M. Bensin, who has been conducting researches at The New York Botanical Garden during the last year, in the March *Bulletin of the Torrey Botanical Club* describes an autogamous rye he discovered in Turkestan in 1912, when making an investigation of Turkestan cereals in relation to drought-resistance. The grain, he says, is peculiarly adapted to the climate, with its heavy southeast winds.

* * * * *

As an example of how chemicals may stimulate the growth of plant organs, there appears in the *Contributions from the Boyce Thompson Institute,* January–March, 1933, an article by P. W. Zimmerman, William Crocker, and A. E. Hitchcock, which shows how adventitious roots appeared on stems of woody and herbaceous plants after exposure to carbon-monoxide gas. This article was awarded the A. Cressy Morrison prize in experimental biology in 1932 by the New York Academy of Sciences.

* * * * *

Every seven years the elm aphid goes to the apple tree, says Edith M. Patch in the March *Nature Magazine.* In the same issue, Romaine B. Ware writes on "Trees to Grace the Garden" and Louis E. Reichard describes some diatoms.

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"A Teaching Guide to the Trees and Shrubs of Greater New York" by Arthur Harmount Graves and Hester M. Rusk has been issued by the Brooklyn Botanic Garden.

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Orchids of Wisconsin, with photographs, many detailed illustrations, and maps showing the location of each species and other data of ecological interest, occupy the *Bulletin* of the Public Museum of the City of Milwaukee issued February 23, 1933. Albert M. Fuller is the author of this monograph, and George L. White the photographer.

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"How Experts Feed their Rhododendrons" is the subject of Donald Lindsay in *Horticulture* for February 15.

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The February *Nursery Disease Notes* of the New Jersey Agricultural Experiment Station report experiments with gladiolus scab control during 1932.

Included in the March *American Home* are valuable articles on roses, a budget garden, seed-buying, lawns, and late flowers in the rockery.

* * * * *

A study of Pleistocene plants from two building excavations in Washington, D. C., made by Edward W. Berry and published in the *Journal of the Washington Academy of Sciences* for January 15, reveals practically the same plants as occupy the middle Atlantic and southern states today, though they are slightly different from fossil plants previously found in other excavations in Washington. R. S. Williams of The New York Botanical Garden identified the mosses found.

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"Some Poisonous Plants of New Jersey" is the title of Circular 261 of the New Jersey Agricultural Experiment Station. Jessie G. Fiske, who has illustrated her work with drawings and photographs, tells how and what part of each plant mentioned is poisonous.

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T. H. Everett is now handling a rock-garden column in the *Gardeners' Chronicle of America,* in which the progress of the new rock garden being constructed at The New York Botanical Garden will from time to time be reflected.

Among other noteworthy articles in the February issue are "Some Little Bulbs for Springtime" by Drew Sherrard, "The Vegetable Garden Beautiful" by Florence Taft Eaton, and "Bush Fruits for Home Gardens" by M. G. Kains.

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In "Something for the Bald Spots" in *Nature Magazine* for February, Victor H. Ries tells what to plant in places where grass will not grow.

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Robert F. Griggs of George Washington University is the author of a "Key to the Families of Flowering Plants Wild or Cultivated in Northeastern United States" for use with the seventh edition of Gray's Manual.

In "Fungous Friends and Foes" in volume 9 of *Popular Science Talks* published by the Philadelphia College of Pharmacy and Science, Marin S. Dunn touches the high spots of the whole field of fungi in a brief survey. He describes the types and forms and their unique life histories, and calls attention to useful and dangerous fungi, such as mushrooms, used for food, or species of *Penicillium,* which flavor certain choice cheeses, and the many kinds that cause disease. His object, he says, is to stimulate further study of the group.

* * * * *

In "The Age and Size of Plants" in the December *Scientific Monthly,* Joseph Chamberlain tells of large and small plants that are famous for their age. He illustrates with photographs of the Big Tree of Tule, the Mexican tree with a trunk fifty feet in diameter, said to be 5,000 years old, a *Sequoia gigantea,* Monterey cypresses, and a thousand-year-old cycad only five feet tall, also growing in Mexico.

CAROL H. WOODWARD.

A NEW BOOK ON WEEDS OF THE TROPICS[1]

In "A Handbook of some South Indian Weeds" recently printed by the Government Press at Madras, India, the authors, C. Tadulingam and G. V. Narayana, have set forth descriptions of weeds characteristic of the tropics of the whole world. Many are plants which are pests not only in southern India, but in Europe and America as well, while some have economic value in their native land and others horticultural value when transplanted elsewhere.

The uses of each specimen are mentioned by the authors, as well as means of eradication of the plants as weeds. The descriptions, while somewhat informal, appear complete and un-

[1] Tadulingam, C., & Narayana, G. V. A handbook of some South Indian weeds. i–vii + 356 pp. 132 plates. Government press, Madras, 1932.

usually clear. With the aid of the illustrations, identification can be readily made. An important feature of the illustrations consists of enlarged views of more than a hundred common weed seeds, and drawings of a number of weed seedlings.

In the introductory chapters, weeds are classified in four different ways: according to the length of their life, the economic uses of the ground in which they grow, their ecological associations, and whether they are indigenous or introduced. Poisonous, parasitic, and pond weeds are given special consideration, and chapters are also devoted to losses and methods of preventing the spread of weeds.

The authors have been considerate in including, besides Latin and English names of plants described, the Tamil, Malayalam, and Telugu names.

CAROL H. WOODWARD.

TWO NEW BOOKS ON FLORIDA[1]

We in northern latitudes have little conception of the great wealth of tropical plants which may be cultivated out of doors in Florida. Even in conservatories, we cannot hope to grow large trees and shrubs to their height of perfection.

This fact is continually impressed upon one's mind in reading Dr. Nehrling's "The Plant World in Florida."

In it are found described, shade trees and shrubs, palms, figs, orchids and other epiphytes, flowering vines, bulbs, grasses, cacti and foliage plants, the majority of which are known to the northerner only by hearsay or reading, unless he has access to some large conservatory, and even then, one sees only a poor few of all of the plants herein described.

The notes, in many cases giving exceedingly well-written and readable descriptions of the plants as they naturally appear, or as Dr. Nehrling grew them in his Florida gardens, also tell in what part of the state they may be best grown.

[1] Nehrling, Henry. The plant world in Florida. i–xvii + 1–304. The Macmillan Co., New York, 1933. [illust.] $3.50.

Simpson, Charles T. Florida Wild Life. i–xii + 1–199. The Macmillan Co., New York, 1932. [illust.] $2.50.

The book contains also a number of fine photographs, showing both well- and little-known plants in flower.

All honor is due to the collectors and editors of these manuscripts, for they have brought together and preserved an exceedingly interesting set of notes, thus preserving the memory and work of a man who obviously was a great lover of the floral world in which he found himself.

* * * * *

If one wishes information as to the wild life of Florida, especially as to plants, in a popular, exceedingly readable and interesting form, one need seek no further than Simpson's "Florida Wild Life." Here is a book wherein a man has bared the indelible impressions gathered from fifty years of close contact with our nearest tropical wilderness, and if, in the writing, a few feelings are teased, it is forgiven in the enticing interest aroused by a man who saw, understood, and loved the beauties of nature as he saw them.

One learns of a tree that walks, reads of sea-shells and fishes, fights to exasperation beside the author in a tangle of *Mentzelia*, hears of the fiercely spine-armed *Pisonia*, and of the rattans of the Philippines, whose spines are so terrible that even the priests swear about them, and reads of the wonderful Cape Sable region, all with unmitigated interest, only to find at the end that these descriptions are of Florida as it was before the wildcat real-estate booms destroyed much of its natural beauty, and left so few unruined portions that only early action in forming a National Park in the Cape Sable district will preserve a virginal bit of the tropics to delight visitors.

One may well class this work as the closing performance of a richly spent life amid glories of nature that a man grieved to see being destroyed by those who sought only such wealth as they could glean for a bank-account.

Dr. Simpson's recent death leaves this book as well as many others as memorials to his character and to his interest in tropical Florida.

E. J. ALEXANDER.

NOTES, NEWS AND COMMENT

Dr. H. A. Gleason, Head Curator, delivered an address March 23 at West Virginia University on "Botanical Features of Northern South America."

Dr. E. D. Merrill, Director-in-Chief, gave an illustrated lecture on "Crop Plants and Civilization" before the Westchester Institute of Sciences at the Boyce Thompson Institute for Plant Research in Yonkers on the evening of March 17. The substance of this address is being published in the May–June issue of *Natural History.*

A collection of herbarium specimens has recently been received through coöperation with Dr. B. A. Krukoff from the region of the Río Maracassumé in eastern Brazil. This region marks the approximate boundary between the Amazonian rain forests and the much more xeric vegetation of eastern Brazil. Since it has never before been botanized, the present collection is one of unusual interest and scientific value. Mr. Krukoff leaves New York again for a fourth expedition into Brazil and expects to return in January, 1934.

The following visiting botanists registered in the library during the winter: Prof. Geo. S. Avery, Jr., New London, Conn., Dr. E. H. Eames, Bridgeport, Conn., Prof. H. H. Whetzel and Prof. L. H. Bailey, Ithaca, N. Y., Dr. Francis W. Pennell, Philadelphia, Pa., Mr. Earl L. Core, Morgantown, W. Va., Dr. E. B. Mains and Mr. W. C. Steere, Ann Arbor, Mich., Prof. Shigeo Yamanouchi, Chicago, Ill., Dr. Forest Shreve and Dr. D. T. MacDougal, Tucson, Ariz., Dr. W. W. Robbins, Davis, Cal., Dr. Ralph W. Chaney, Berkeley, Cal., Frère Marie-Victorin, Montreal, Can., and Dr. Erling Christophersen, Oslo, Norway.

Dr. Arthur Hollick, Research Associate in Paleobotany, died at the Union Hospital, Borough of the Bronx, on March 11, one week after undergoing a surgical operation for the removal of a malignant tumor. He was a member of the scientific staff of The New York Botanical Garden continuously from July 1, 1901,

to the time of his death, though for a period of more than six years (January, 1914, to August, 1921), during most of which time he was Director of the Public Museum of the Staten Island Institute of Arts and Sciences, his name was carried on the staff list as an Honorary Curator. He had completed his 76th year on February 6, but remained vigorously active up to his last few days. Late in January he returned from a six weeks' visit to Cuba for the collection and study of fossil plants. It is expected that a more extended notice of the life and career of Dr. Hollick will appear in a later number of this JOURNAL.

Meteorology for January: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 58° on the 7th; *61° on the 11th;* 59° on the 17th; and *61° on the 23rd.* The minimum temperatures recorded were: *13° on the 1st; 27°* on the 3rd; *22°* on the 13th; 33° on the 21st; and 28° on the 30th. The total precipitation for the month was 1.30 inches. Traces of snow fell on the 26th.

Meteorology for February: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 59° on the 2nd; 60° on the 8th; 58° on the 18th; and *62° on the 23rd.* The minimum temperatures recorded were: 12° on the 6th; *10° on the 9th;* 17° on the 16th; and 23° on the 27th. The total precipitation for the month was 3.16 inches. One inch of snow fell on the 4th; 8 inches on the 11th; and traces on the 9th. This has been figured in the total amount of rainfall as .90 inches.

LIBRARY ACCESSIONS, APRIL 1 MAY 31, 1932

ALDERWERELT VAN ROSENBURGH, C. R. W. K. VAN. *Malayan fern allies: handbook to the determination of the fern allies of the Malayan islands.* Batavia, 1915.

ARVET-TOUVET, JEAN MAURICE CASIMIR. *Essai sur les plantes du Dauphiné.* Grenoble, 1871.

ATKINS, WILLIAM RINGROSE GELSTON. *Some recent researches in plant physiology.* London, 1916.

BAILEY, LIBERTY HYDE. *The principles of vegetable gardening.* Ed. 3. New York, 1904.

BAILEY, LIBERTY HYDE, & BAILEY, ETHEL ZOE. *Hortus: a concise dictionary of gardening, general horticulture, and cultivated plants of North America.* New York, 1930.

BAILLON, HENRI ERNEST. *Errorum Decaisneanorum graviorum vel minus cognitorum,* Centuria 1–7. Paris, [1879].

BATAILLE, FRÉDÉRIC. *Flore monographique des Cortinaires d' Europe.* Besançon, 1912.

———. *Les Bolets: classification et détermination des espèces.* Deuxième tirage. Paris, 1923.

BEWS, JOHN WILLIAM. *An ecological survey of the Midlands of Natal, with special reference to the Pietermaritzburg district.* [Durban, 1913.]

BLATCHLEY, WILLIS STANLEY. *My nature nook; or, notes on the natural history of the vicinity of Dunedin, Florida.* Indianapolis, 1931.

BOCQUILLON, HENRI. *Anatomie et physiologie des organes reproducteurs des champignons et des lichens.* Paris, 1869.

BOGGS, KATE DOGGETT. *Prints and plants of old gardens.* Richmond, 1932.

BOSE, JAGADIS CHUNDER. *Growth and tropic movements of plants.* London, 1929.

BOWER, FREDERICK ORPEN. *Plants and man: a series of essays relating to the botany of ordinary life.* London, 1925.

BULLER, ARTHUR HENRY REGINALD. *Researches on fungi.* Vol. 4. London, 1931.

BURBERRY, H. A. *The amateur orchid cultivators' guide book.* Liverpool, 1894.

BURBIDGE, FREDERICK WILLIAM. *Horticulture.* London, 1877.

BURGEFF, HANS. *Saprophytismus und Symbiose: Studien an tropischen Orchideen.* Jena, 1932. (Given by Dr. E. D. Merrill.)

CALVEL, ETIENNE. *Traité complet sur les pépinières.* Ed. 2. 3 vols. Paris, 1805.

CAMUS, AIMÉE. *Les arbres, arbustes et arbrisseaux d' ornement.* Paris, 1923.

———. *Les fleurs des marais, des tourbières, des cours d' eau, des lacs et des étangs (plantes palustres et aquatiques).* Paris, 1921.

CANDOLLE, ALPHONSE LOUIS PIERRE PYRAMUS DE. *Origine des plantes cultivées.* Ed. 4. Paris, 1896.

CAPITAINE, LOUIS. *Étude analytique et phytogéographique du groupe des Légumineuses.* Paris, 1912.

CAUMEL, JEAN-BAPTISTE (*Frère Héribaud Joseph*). *Disposition méthodique des Diatomées d' Auvergne.* Clermont-Ferrand, 1903.

CIFERRI, RAFAEL. *Micoflora domingensis: lista de los hongos hasta la fecha indicadas en Santo Domingo.* Santo Domingo, 1929.

CORDIER, FRANÇOIS SIMON. *Histoire et description des champignons alimentaires et vénéneux qui croissent sur le sol de la France.* Nouvelle ed. Paris, 1836.

COSSON, ERNEST SAINT CHARLES, & KRALIK, JEAN LOUIS. *Catalogue des plantes observées en Syrie et en Palestine e Décembre 1850 à Avril 1851 par MM. de Saulcy et Michon.* Paris, 1854.

COULTER, JOHN MERLE. *Fundamentals of plant breeding.* New York, 1914.
COUTTS, JOHN. *All about gardening.* New & rev. ed. London, 1931.
———. *Every day gardening.* London, 1931.
COUTTS, JOHN, EDWARDS, ALEXANDER, & OSBORN, ARTHUR. *Complete book of gardening.* London, 1931.
COX, EUAN HILLHOUSE METHVEN. *The plant introductions of Reginald Farrer.* London, 1930.
———. *Wild gardening.* London, 1929.
COX, EUAN HILLHOUSE METHVEN, & TAYLOR, GEORGE CROSBIE. *Primulas for garden and greenhouse.* London, 1928.
CRANE, FLORENCE (HEDLESTON). *Flowers and folk lore from far Korea.* Tokyo, 1931. (Given by Dr. E. D. Merrill.)
DEAM, CHARLES CLEMON. *Trees of Indiana.* Indianapolis, 1919.
DEFLANDRE, GEORGE. *Microscopie pratique: La faune et la flore microscopiques des eaux.* Paris, 1930.
———. *Monographie du genre Trachelomonas Ehr.* Nemours, 1926.
———. *Strombomonas, nouveau genre d' Euglénacées (Trachelomonas Ehrb. pro parte).* Jena, 1930.
Description des produits forestiers du Japon exposés à l' Exposition universelle de 1900. Paris, n.d.
D[ESHAYES, PIERRE MARIE]. *Le vade-mecum du botaniste voyageur aux environs de Paris à l' usage des personnes qui ont la flore de J. L. Thuillier.* Paris, 1803.
DESMAZIÈRES, JEAN BAPTISTE HENRI JOSEPH. *Catalogue des plantes omises dans la botanographie belgique et dans les flores du nord la France.* Lille, 1825.
DIARD, PIERRE. *Catalogue raisonné des plantes qui croissent naturellement à St.-Calais et dans ses environs.* Revu par Ed. Guéranger. Saint-Calais, 1852.
DICKSON, JAMES HILL. *A series of letters on the improved mode in the cultivation and management of flax.* London, 1848.
DODWELL, EPHRAIM SYMS. *The carnation & picotée—its history, properties and management.* London, 1886.
DUPINET, ANTOINE DE NOROY. *Historia plantarum. Earum imagines, nomenclatura, qualitates & natale solum.* Ed. 2. Lugduni, 1567.
DYKES, WILLIAM RICKATSON. *Notes on tulip species.* Edited and illustrated by E. Katharine Dykes, with an introduction by A. Daniel Hall. London, 1930.
EBERHARDT, PHILIPPE. *Les plantes médicinales et leurs propriétés.* Paris, 1926.
EBRAY, THÉOPHILE. *Végétaux fossiles des terrains de transition du Beaujolais.* Paris, 1868.
EDWARDS, ALEXANDER. *Rock gardens: how to plan and plant them, with sections on the wall, paved, marsh, and water gardens.* London, n. d.
EVELYN, JOHN. *Sylva; or, a discourse of forest trees . . . to which is annexed Pomona; or, an appendix concerning fruit-trees in relation to cider: also Kalendarium hortense.* Ed. 2. London, 1670.

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JOURNAL
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JOURNAL
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GUM-JUM OR GUM-TSOY: A FOOD FROM THE FLOWERS OF DAYLILIES[1]

The flowers of daylilies (*Hemerocallis*) are extensively used as a food in the Orient and in this use they are regarded as a delicacy, especially by the Chinese. They may be used fresh from a plant but they are employed chiefly in a dried form, which is easily handled in commerce and provides a supply at all times.

In certain areas in China and especially in Szechwan and along the Yangtze Valley, daylilies are grown as a crop plant for the yield of flowers, which are gathered shortly before they open. Evidently they are then easier to handle and probably those wilted and closed after the period of flowering have less substance. The flowers are dried, just how the writer has not learned, and then shipped in large bundles or hampers to some point where they are wrapped in paper for retail. Packages of pound and half-pound sizes are sold very generally in food shops under the names *gum-tsoy,* meaning golden vegetable, and *gum-jum,* meaning golden needles.

In culinary uses the flowers of daylilies are employed chiefly in soups, in various meat dishes, and with noodles. In preparation the basal end of the dried flowers, consisting of the ovary, is removed and the rest is cut into several segments. Enough water is added to the quantity desired to insure complete soaking, which soon makes the parts become soft, pliable, and somewhat gelatinous. In this condition the material is added to soups that are already cooked, and when the whole is brought to a boil again, a

[1] For most of the information here given the writer is indebted to Mr. F. H. Lewis, of the United States Appraiser's Office in New York.

matter of a few minutes, the dish is ready to be served. To various dishes of meats and noodles the soaked flowers are added during the final stages of cooking, or the flowers may be cooked separately for a few minutes and added as a garnish somewhat as mushrooms are often employed.

To these various dishes the flowers add substance of individual consistency and they supply a distinct and pleasing flavor that is best appreciated and realized by the eating. Flowers that are

FIGURE 1. Pound and half-pound packages of gum-jum of the kinds imported for sale in New York City.

freshly collected may be used in quite the same way, but the flavor is somewhat different from that when dried flowers are used.

Dr. Albert N. Steward of the University of Nanking states that in his experience in east central China the flowers may be collected for use as food after they have closed and begun to wither. A recipe which he reports is the following:

"Fry small pieces of pork until they are brown, then add a little soy-bean oil and water. After cooking for an hour add the flowers and cook until they are tender. The addition of a little salt improves the flavor."

It is said that in China gum-jum is used by both rich and poor and that in many sections there is scarcely a family that does not use this article of food. Also, the product is used to some extent in other countries. During certain years as many as 4000 pounds have been brought from China into the port of New York City for consumption.

The following statement is quoted[2] from a publication called "The Principal Articles of Chinese Commerce," compiled by the Inspectorate General of Customs, Shanghai, 1930.

"LILY FLOWERS, DRIED, (Chin-chen-ts'ai or Huang-hua-ts'ai). Lily flowers (dried) are the dried flowers of *Hemerocallis graminea* and of *Lilium bulbiferum*. Dr. Stuart says: 'They consist of inferior, tubular perianths of the unopened flower, enclosing six introrse stamens, with the three-celled, superior ovary, and simple stigma characteristic of liliaceous plants.' As they appear in the Chinese market, dried lily flowers are dark brownish yellow in colour, translucent, wrinkled, more or less twisted, in lengths of 4 or 5 inches, and covered with a whitish mould or bloom; they have an agreeable odour and a sweet, mucilaginous taste and are used by Chinese chiefly as a food, particularly as a relish with meat dishes. The Chinese also use them in medicine, considering them to be antifebrile and anodyne and to possess stimulating and intoxicating properties.

"Lily flowers are produced chiefly in Szechwan and along the Yangtze Valley; they form a staple product of North Kiangsu and are usually packed for the market in large mat-covered bales weighing from 300 to 400 catties."

It may be noted that mention is here made of the fact that the dried flowers of daylilies are also utilized to some degree as a medicine in China.

The writer has not yet learned which, if any, type of daylily provides the best flowers for food. The dried flowers available for examination appear to be of a type of daylily (*Hemerocallis*) with narrow perianth-tube, narrow segments, and pale yellow coloring, and in the material examined to date there have been no flowers of *Lilium*. However, living plants obtained from

[2] For this reference the writer is indebted to Mr. Julean Arnold, Commercial Attaché, United States Department of Commerce, at Shanghai, China.

Szechwan[3] of the sort said to be cultivated there for its flowers have flowers of fulvous color and are to be classed as *Hemerocallis fulva*. In Japan the botanical name *Hemerocallis esculenta* has recently (Bot. Mag. Tokyo 38: 28. 1925) been applied to a wild type of fulvous daylily.

A study[4] of the chemical analysis of the dried flowers of daylilies purchased in the market at Peking reports 2.77% fat, 5.35% ash, 11.42% protein, 8.48% crude fiber, all on dry basis, and a calculated carbohydrate percentage on a wet basis of 10.44%. According to this, the carbohydrate content in the dried flowers is high. The accompanying description is as follows: "Huang hua ts'ai, *Hemerocallis fulva*, are dried yellow flowers that are used as a food. The Filipino market name is bulaklak nang saging, because it is erroneously supposed to have some connection with the banana." In this report we note the Filipino name for this food and a different Chinese name from the usual gum-jum and gum-tsoy. The *Hemerocallis fulva* has flowers that are fulvous.

Possibly the flowers of any daylily are suitable for use as a food in the manner reported above.

A. B. STOUT

AN EXHIBIT OF "PLANT FORMS IN ORNAMENT"

The New York Botanical Garden, in coöperation with the Brooklyn Botanic Garden and the Metropolitan Museum of Art, is holding an exhibition of "Plant Forms in Ornament," at the Metropolitan Museum, from May 8 to September 10, 1933. Objects of art containing plant forms are exhibited, together with such plants, flowers, specimens and illustrations as are available for comparison.

[3] These were obtained and sent to the Garden by Mr. W. P. Hsieh of the University of Chengtu through the arrangements made by Mr. Chien Pei while the latter was studying at the New York Botanical Garden in 1930.

[4] Sherman, Hartley E., & Wang, Tsan Ching. Chemical analysis of thirty-seven oriental foods. The Philippine Journal of Science 38: 67–78. 1929.

Some well-known plants furnishing design for ornament are: acanthus, carnation, crocus, cypress, daisy, dandelion, willow, fern, edelweiss, foxglove, hepatica, hyacinth, iris, ivy (English and Japanese), lily, palm, papyrus, peony, pineapple, pink, poppy, rose, strawberry, tulip, wisteria, violet, yarrow, date palm, fir, bamboo, chrysanthemum, lotus (Egyptian and Indian), thistle, grape, laurel, lemon, myrtle, olive, wheat, anemone, celandine, clover, mallow, narcissus, marigold, passion-flower, plantain, pomegranate, almond, azalea, cucumber, cyclamen, egg-plant, ginger, ginkgo, hollyhock, *Kerria japonica,* morning glory, radish, rhubarb, sweet William, and taro.

Armor, china, glass, furniture, rugs, tapestries, tiles, clothing, and wall-paper are some of the objects exhibited, and the plant life represented in them is extremely varied. One finds that even the tendril of the vine is important. Leaf, stem (in its mode of branching or twining), stipule, bud, flower in every phase, fruit and seed enter into the forms of ornament found in museums, and after the direct copies come the innumerable and various forms which the artist or designer has made from them.

Of the Assyrian style, we can show at the exhibit only a few familiar plant forms—the date, the fir, the pine-cone, and the vine.

We display pine-cone and pine, which was said to be *Pinus brutia,* of the monuments of Assyria, the pine tree, young, symmetrical and simulating the shape of the cone-fruit used in the same monument style. A cedar of Lebanon cone might have been more properly presented. The date-palm is supposed to furnish the motive for palmettes in Assyrian decorations.

Very familiar plants are discernible in Egyptian forms. They are the crocus, palm, rose, grape, and of course the lotus and the papyrus. The latter lend themselves to exhibition well in connection with water. The well-known Egyptian lotus may be either the white or the blue Nymphaea, and the Nelumbo, which is the lotus of Asia, is also included.

The Greek and Roman sources are doubtless known by most. Beginning with the acanthus columns, such common plants as the laurel or bay, the olive, the myrtle, the oak, the grape, and the poppy are studied early by students of art.

When we come to the Near Eastern, we are able to find the carnation, daffodil, tulip, iris, hyacinth, chrysanthemum, pomegranate, on to the cypress and the plane tree.

In the medieval are found the most widely diversified forms. In addition to the usual tulip, pomegranate, acanthus, laurel or bay, rose, olive, iris, ivy, grape, and lily, one finds *Arum maculatum* and bryony, foxglove, fern, cinquefoil, marigold, forget-me-not, bellflower, pinks, and other garden flowers.

Examples of plant forms from the Chinese and Japanese are especially interesting to the horticulturist who is able to grow so many hardy plants in gardens from those countries. The common ones are chysanthemum, wisteria, peony, rose, narcissus, and Japanese iris. Then come the almond, cherry, plum and peach trees which they have so well in flower; the Yulan magnolia and certainly the bamboo.

The acanthus, a classic leaf-form of architecture, represented in capitals of Corinthian columns, in wood-carvings, in rugs, tapestries, textiles and metals, is usually found in gardens as a hardy perennial. The commoner is *Acanthus mollis* in the form known as *latifolius*, the broad-leaved acanthus. Secondary in importance is *Acanthus spinosus*, the spiny acanthus. The acanthus leaf will be easily recognized wherever present in the Museum; it is to be hoped that many gardens may have the hardy *A. mollis latifolius* to maintain one of the classic ornament designs.

The lotuses, prominent in any exhibit of this kind, are to be shown growing naturally. The true Egyptian, which is a waterlily, *Nymphaea caerulea* in the case of the blue, and *Nymphaea alba* for the white, very closely resembles some of our modern tender waterlilies. The Indian or Chinese lotus, Nelumbo, is the most robust of all aquatic plants cultivated in horticulture, and while not easy to exhibit in flower, it can usually be represented by leaf and seed-pod. In this connection it is interesting to note that we have in eastern United States both waterlilies (*Nymphaea odorata*) and Nelumbiums (*Nelumbium luteum*), which we may call "lotus." The lotus of the "lotus-eaters," which is found in literature, is a relative of the jujube, a prickly shrub for dry, warm climates.

The papyrus is displayed in natural surroundings, in the pool with the lotus. This plant, from which the Egyptians made

paper, furnished a subject for design with the lotus and palm, and is one of the most suitable of the living plants to exhibit and to be compared with the counterpart in art.

The pomegranate, *Punica Granatum*, has almost as many uses in a museum of art as the acanthus and the grape. The fruit is the principal part of the plant used in design. Especially in the Egyptian and Assyrian art, with fruit closed, or open, disclosing the seed, is the pomegranate prominent.

The grape, after the lotus, became one of the foremost plants in furnishing designs for ornament, and is considered generally as the "vine" of all cases where the ivy is not intended.

The cypress tree and the almond flower combined, the evergreen as a background, and the flowering tree furnishing sprays of flowers, are conspicuous in Persian and Asia Minor art. The carnation and the pointed-petaled tulip are common flowers.

Crete, with jars and textiles, offers many flower designs. Crocus, lily, marigold, daisy, olive, and laurel or bay are subjects of Minoan (ancient Cretan) art.

Chinese art exhibits the peony, pomegranate, bush-clover, gourd, grape, bamboo, weeping willow, Yulan magnolia, chrysanthemums, various flowering fruit-trees, and the pao hsiang hua, an unidentified composite found on much Chinese pottery.

Familiar plants are often found in popular subjects. Wedgewood ware may display the acanthus, jasmine, and classic laurel. South German art may show a fern with fruiting bodies, and German glass may exhibit tulips, marguerite, lilies, and bleeding heart.

French china exhibited combines convolvulus, pinks, buttercup, lilac, and anemone. Korea gives us art objects with single chrysanthemum, plantain banana, and ornamental grasses.

Japanese subjects are typical and perhaps better known than some others. Ginkgo, which we desire as a thriving street-tree; bush-clover, a late-flowering shrub for gardens; paper mulberry, chrysanthemum, millet, dwarf evergreens; even radishes, reeds, and grasses, are found in displays of Japanese art, and are more readily identified than most other floral subjects.

KENNETH R. BOYNTON.

URSINIA ANETHOIDES

Of the various annuals cultivated in pots for the embellishment of the display greenhouse in Conservatory Range No. 1 of The New York Botanical Garden during recent months, none has attracted more attention than the South African *Ursinia anethoides*. That many gardeners are as yet unfamiliar with this useful composite is quite evident from the number of queries received at the Garden, while the specimens used for the decoration of our booth at the International Flower Show excited much favorable comment among visitors.

Ursinia anethoides is an elegant species, bearing over a long period a profusion of brilliant orange "daisies," each having a rich crimson-purple ring surrounding the disc. Individuals may exceed 2½ inches in diameter, and as they are supported on slender wiry stems they lend themselves admirably for use in cut flower arrangments. In the bud stage the flower stems recurve at the tips and appear to be drooping so that one might suppose the plants were suffering from lack of water, but as the buds expand the stems become erect and the flowers are thus shown to best advantage. The small, finely dissected foliage is ample, and neat in effect.

When required for spring-blooming in the greenhouse, seed should be sown in September and the plants grown under cool, airy conditions and in a rich, well-drained soil. Full exposure to light is essential. The young plants should be potted on until they are accommodated in receptacles six inches in diameter, in which size they may be permitted to bloom. Well-grown specimens will attain a height of three feet or more.

This subject is also excellent for the outdoor garden and succeeds well if provided with a perfectly drained site and a sunny position. One may treat it as a half-hardy annual, sowing the seed indoors in March and transplanting later, or sowing seed early in May where the plants are intended to bloom. Out-of-doors the plants average eighteen inches in height.

Unlike the majority of South African composites, the flowers of this *Ursinia* do not close during dull weather, but remain expanded even under artificial light. A rather wide variation in size of flower and other characters is shown within the species,

and it seems probable that garden forms will become fixed in course of time.

For the introduction into cultivation of this plant we are in-

FIGURE 1. *Ursinia anethoides*, one of the new South African composites raised this year at The New York Botanical Garden.

debted to Mr. Thomas Hay, the Superintendent of Hyde Park and other royal parks in London, England. Seed was received from a correspondent in South Africa and Mr. Hay exhibited plants before the Royal Horticultural Society in 1928, when they were granted an award of merit.

It is of interest to note that, of about sixty species of the genus *Ursinia* which have been described from South Africa and Abyssinia, only three have ever been in cultivation. These are *Ursinia anethoides*, *U. anthemoides*, and *U. pulchra*. *Ursinia anthemoides* is less desirable than the species under notice from a garden viewpoint. *Ursinia pulchra* is similar in general effect to *U. anethoides* but of dwarfer stature. This species also is now in cultivation at the Botanical Garden.

T. H. Everett.

OUR LARGEST LADIES'-TRESSES

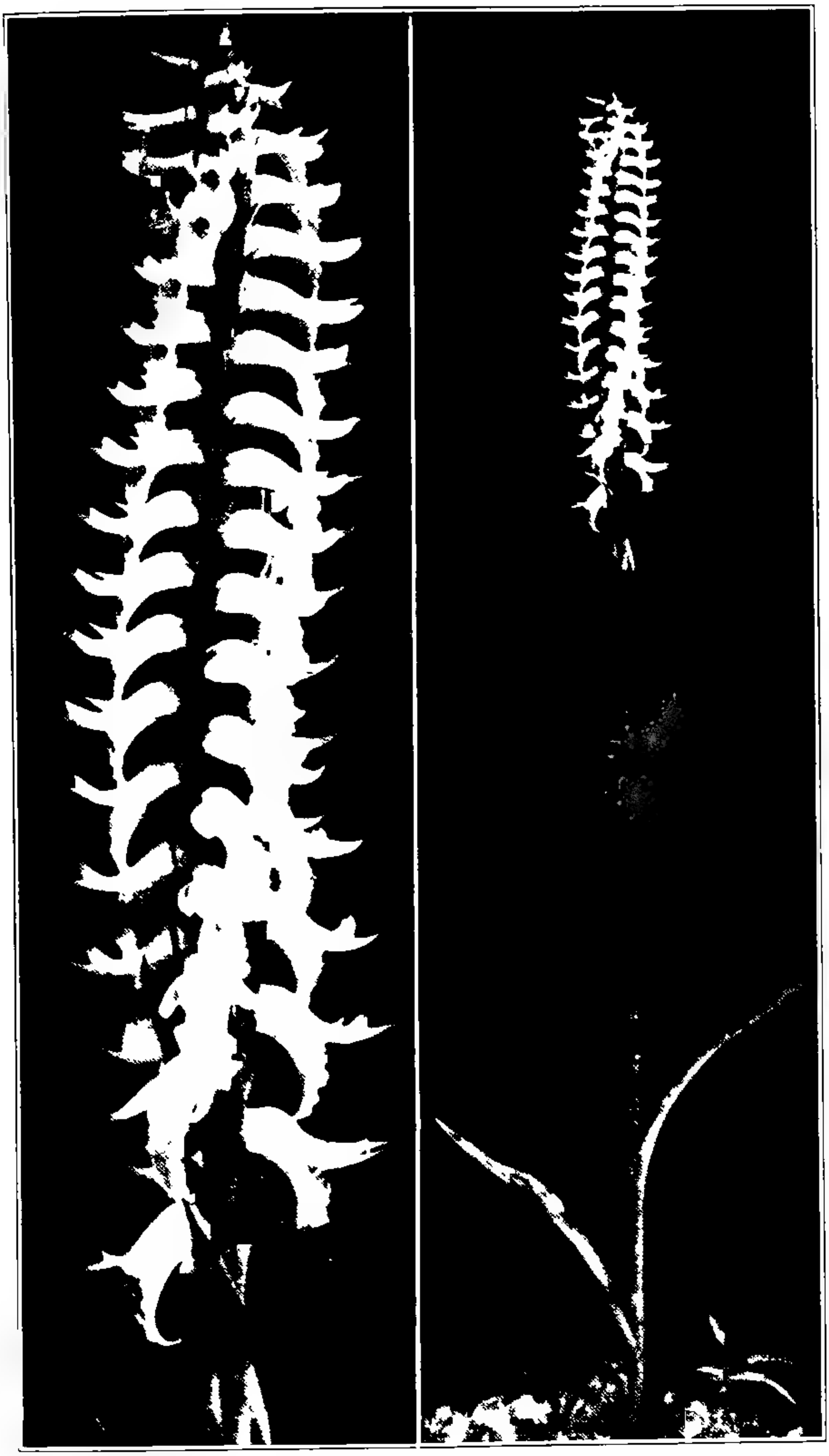
"The largest and finest *Spiranthes* in the United States, possessed also of a very sensible and delicate fragrance."[1]

This phrase, introducing Nuttall's discussion of *Neottia odorata*, printed in 1834, holds good today. The first and type collections were made by Dr. H. Loomis on the wet and muddy shores of the Neuse River at Newbern, North Carolina, before 1834. Within a few years after its naming and publication, specimens were collected throughout its present known geographic limit—Florida to Texas and Virginia—except Virginia, which state does not seem to have been represented in herbaria until about a half century later. As far as we know, this orchid is confined to the southern Atlantic and Gulf Coastal Plain.

Three years ago, while collecting iris in southern Louisiana, Mr. J. B. Wallace, a collector and distributor of aquatic plants, brought a series of specimens to our quarters in New Orleans for naming. Among them was a specimen of an *Ibidium*, with the large basal leaves which appear in the spring and summer preparatory to the plant's flowering period in the following fall and

[1] Jour. Acad. Phil. 7: 98. 1834. *Neottia *odorata* Nuttall.

Figure 1 (on opposite page). *Ibidium odoratum:* at right, habit of plant (reduced), showing one stolon; at left, inflorescence, natural size.



winter. This specimen was sent to the Garden, where it thrived under glass, and finally flowered last autumn, at the same time producing three stolons which should flower this coming fall.

About the first of October the plant began to flower in the Propagating House. About the middle of October, after about an inch of the base of the spike was in flower, it was brought over to the Museum Building. Up to November 28th the upper half of the spike was still in flower. The accompanying figure (left side) shows the spike, natural size, at the height of the flowering stage.

This species has had its ups and downs in the botanical books. At times it has been considered to represent a good species and also a form of its closest relative *Ibidium cernuum,* or even a mere part of that species.

The species seems to differ from *Ibidium cernuum* in the narrower, lanceolate, long-acuminate bracts, which are much elongate near the base of the spike, and which do not enfold the ovary, in the linear lateral sepals, and in a lacerate-fringed lip. On the contrary, *Ibidium cernuum* has ovate or ovate-lanceolate, abruptly acuminate bracts that enfold the ovary, lanceolate lateral sepals, and an erose-fringed lip. The fragrance of a single spike of flowers is sufficient to fill a good-sized room, the amount of fragrance increasing toward evening. Recently a dozen strong plants have been received from Mr. Wallace. These have been planted, so that they may be put on exhibition when they flower next fall.

JOHN K. SMALL.

DR. VAVILOV PLEADS FOR CONCERTED WORK IN STUDYING PLANT ORIGINS[1]

A plea for more serious botanical consideration of cultivated plants the world over was made by Dr. N. I. Vavilov, Director of the Institute of Applied Botany, Leningrad, U. S. S. R., in speaking January 30 before members of the staff, botanists from other institutions in New York, and Fordham University stu-

[1] This lecture took the place of the February Conference of the Scientific Staff and Registered Students of The New York Botanical Garden.

dents assembled at The New York Botanical Garden. Dr. Vavilov had just returned from a reconnaissance into South America, where he spent about three months investigating the native cultivated plants of that continent, in preparation for intensive future study there, and he sailed for his home in Russia the following day.

"We are at the beginning of a new era in the development of plants for cultivation," he said, "in which the crossing of species, sometimes with related wild species, is the most promising field. Greater botanical knowledge will open a new world in genetics as related to plant breeding. By locating the original wild habitats of our cultivated plants and collecting as many related species as possible, we hope to create new types which will be particularly adaptable to the peculiar conditions of extreme dryness and severe frosts found in Russia."

The Institute of Applied Botany at Leningrad has sent 150 expeditions to different parts of the world during the past twelve years, all with definite plans to be carried out by the collectors, botanists, and agronomists in attendance. Dr. Vavilov, who is looked upon as one of the foremost investigators of the origins of cultivated plants, has visited most of these regions himself.

"We have found more than we expected," he said, explaining that he was chiefly interested in plants of economic importance to Europe and Asia, but particularly Russia. "In South America alone we collected many new varieties of plants representing several dozen species to which cultivated types belong."

Describing the results of other expeditions, he told of new species of wheat found in Abyssinia, of which one was apparently immune to all wheat diseases.

Valuable new potatoes have also been discovered, he said.

"Most species of tuber-bearing *Solanum* from South America do not produce tubers in Europe," Dr. Vavilov explained. "Some years ago a number of promising plants were introduced into France, but they failed to grow normally under their new conditions, and the work of the French investigators was soon forgotten. It has been discovered since then, however, that these potatoes, when grown in Europe, would produce tubers if subjected to shorter days and longer nights.

"So from Chile, Bolivia, and Peru we brought back numerous

species and varieties which we grew successfully under controlled conditions. A number of new species bearing good tubers were thus disclosed. Some from high altitudes were extremely resistant to frost, and some were practically immune to disease. These newly discovered species open a new field for genetic work in potato breeding."

The lentil is another object of study being directed by Dr. Vavilov, whose aim in plant breeding is to introduce, as parents for hybridizing, hitherto unused wild species of plants related to our present cultivated ones and derived from native regions hitherto little explored. This method is in contrast to the customary practice of merely improving plants already in cultivation, partly through the elimination of weak strains.

He is especially eager to promote research in Abyssinia, which, he says, though unimportant archeologically, contrary to the situation in the native homes of other cultivated plants, contains more varieties of wheat than the rest of the world together, and many indigenous types of other cultivated plants as well.

"Many new dominant characters have been found in Abyssinian plants," he said, "offering new links toward the discovery of the actual origin of cultivated plants. A phytogeographical study of the region would greatly help our investigation of cultivated plants.

"The greatest variety in maize—the American continent's most significant addition to the world's cultivated plants—has been found in Mexico, Central America, and Peru, but chiefly in Central America," Dr. Vavilov continued, explaining further that he considers southern Mexico and parts of Central America as the most significant regions for studying the origin of this plant, as well as most other important American contributions to food. These areas are distinctly more important than the uplands of the Andes, he maintained.

"Cotton," he said, "which is distributed in all countries, even Australia, also has its greatest diversity in southern Mexico and Central America. To understand the actual origin of these plants, it is necessary to study them botanically, for the Old World cottons are specifically distinct from those of the New World.

"A geographical study of plants, especially those in cultivation, is most important. It will provide a vast amount of material

for the consideration of evolutionary problems, which are the greatest problems for the future."

Dr. Vavilov emphasized the fact that only by the collective work of scientists of the whole world can the numerous problems appertaining to the origins of cultivated plants be solved and the improvement of cultivated species be expedited.

CAROL H. WOODWARD.

CONFERENCE NOTES FOR MARCH

The following abstracts summarize the reports presented at the Conference of the Scientific Staff and Registered Students of the Garden held on March 10.

"The Breeding of American Iris: A Progress Report" by Clyde Chandler.

The chief aim of this project in breeding American irises is to hybridize the somewhat tender southern forms with more hardy species in the effort to combine hardiness, large size of flowers, and rich coloring in seedlings that are valuable for garden culture. A second aim is to interbreed the best southern types for improvement through combinations of their best qualities.

Special effort has been made to hybridize the hardy native species of the North, *Iris versicolor,* with such southern species as *I. fulva, I. vinicolor,* and *I. Albispiritus.* Many cross-pollinations have been made, most of which have been complete failures, but a few seeds have been obtained from which seedlings have been grown. All of these resemble *I. versicolor.* All pollinations were controlled by carefully emasculating the flowers before the anthers dehisced and by bagging them with glassine bags before and after the pollinations were made.

Iris foliosa, native as far north as Missouri, was crossed as a seed parent with Dorothea K. Williamson (*I. fulva* × *I. foliosa*). Two of these seedlings have bloomed. They are near *I. foliosa* but darker in color. The reciprocal cross also succeeded. These seedlings vary in color and in markings. One seedling has almost pink flowers. Strong orange-colored midribs on the falls produce eyed effects. These seedlings have a more erect habit of growth than *I. foliosa.* This erect habit is most desirable in garden plants.

The seven seedlings from *I. fulva* × *I. vinicolor* are intermediate in flower color between the two parents.

Seedlings from *Iris fulva* × *I. Albispiritus* vary in color from prune-purple to dark blue-violet, with orange crests.

The fifteen seedlings from *I. vinicolor* × *I. fulva* vary greatly in color, which ranges from dark *fulva, fulva*-color with yellow crests, pale weak colors of tannish *fulva,* pale *vinicolor* (almost rose), dark *fulva* with yellow crest, near *vinicolor* and tannish-rose to wine-red.

Iris Albispiritus × *I. vinicolor* has given seedlings which vary considerably in color, including violet-blue with yellow crest, washed-out purple, and blue-violet with an orange crest.

Iris Albispiritus × Dorothea K. Williamson has given tannish-rose, gray-rose (mauve) and red-violet seedlings. The reciprocal crosses, Dorothea K. Williamson × *I. Albispiritus,* also Dorothea K. Williamson × *I. fulva,* were likewise successful. The seedlings which have bloomed are intermediate in color.

Many of these seedlings obtained by interbreeding southern forms of American irises have colorings and markings which seem to give them merit as garden plants. The hardiness of these seedlings is being tested at the present time. They have been divided and a portion of each one has been planted in the nursery.

During the season of flowering in 1932, approximately 300 cross-combinations were made between different types of southern irises. Material at this time was abundant. From the twenty types which were selfed, 716 seeds have been planted. As many as 4,500 seeds from crosses have also been planted. The corky seed-coats were removed before planting, and the seeds began germinating within 30 days. The removal of the seed coats hastened germination about six months, and 700 seedlings are already potted.

It is the plan to continue this breeding work during the next season of flowering.

"The Genus *Espeletia* as an Illustration of Páramo Endemism" by A. C. Smith.

The outstanding geographic feature of the northern Andes is the so-called *páramo* belt, an extent of alpine meadows reaching

from about 3200 meters of altitude upwards to the mountain summits or to the snow line. The climate of this region is cool and moist, with no apparent dry season. Botanically, the páramos are of great interest because of the development of endemism. Each páramo group is separated from others by a considerable extent of comparatively low country which is hostile to the migration of most páramo plants.

The helianthoid composite genus *Espeletia* is an excellent illustration of páramo endemism. About 20 species are known, of which nearly half are endemic to the Andes of Mérida, Venezuela. The remaining species are found throughout Colombia and southward to northern Ecuador. Each species is strictly limited to a páramo group, although several species may be found in one such group. The plants, locally known as *frailejónes,* are for the most part perennial herbs, often with a stout erect caudex, bearing leaves and inflorescences at its summit. They are characterized by a growth of dense woolly hairs which envelop leaves and inflorescences. The question arises as to the method by which these species evolved from a presumably common ancestor. The fact that the species of *Espeletia* are quite distinct from one another and apparently do not hybridize freely, together with their sharply delimited ranges, make the genus an excellent approach to the problem of páramo endemism.

A. B. Stout,
Secretary of the Conference.

A GLANCE AT CURRENT LITERATURE[1]

Among the many interesting botanical contributions to *Papers of the Michigan Academy of Science, Arts and Letters* for 1932, just published, is a presentation of "Some Chippewa Uses of Plants" by Melvin R. Gilmore, in which the Indian's sound knowledge of plant ecology and phenology is revealed. He knows, says the author, when is the most favorable time to strip the outer bark from birches without injuring the trees, and he watches for the young oak leaves to become the size of a squirrel's ear as the signal for the time to plant his corn.

[1] All publications mentioned here—and many others may be found in the library of The New York Botanical Garden, in the Museum Building.

In the same volume, Dr. H. A. Gleason of The New York Botanical Garden contributes some notes on Melastomataceae from Central America, from a collection made by H. H. Bartlett while on an expedition into the Maya area.

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"Plant Succession on Levees in the Illinois River Valley" is the subject of an ecological study reported by Lewis M. Turner in *Transactions of the Illinois State Academy of Science* for the 24th annual meeting. Levees ranging from one to forty years in age were examined.

A practical drier for botanical specimens is described by J. T. Buchholz in the same volume.

* * * * *

Five women botanists have contributed to *The Journal of Ecology* for February. Nellie Carter writes on the "Alga Flora of Two Salt Marshes," Winifred E. Brenchley and Katherine Warington on "The Weed Seed Population of Arable Soil," Dora Weintroub on "Aquatic and Sub-aquatic Vegetation of the Witwatersrand," and Miss Brenchley and Signe E. Heintze are the authors of short articles.

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Turning to gardens, drought-resistant annuals are described and listed according to color by Elizabeth Seymour Rawlinson of Virginia in the March *Bulletin of the Garden Club of America.*

Romaine B. Ware writes on "Little Gardens" in April *Nature Magazine* and on "What to Plant for Garden Color" in the April *American Home.*

Special features of *Horticulture* for March 15 include the planning of a vegetable garden, advice to amateurs on roses, pools for water lilies, and articles on saxifrage and gladiolus.

A Rhode Island woman tells of her financial success with a vegetable garden in *The Flower Grower* for April.

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"The Rock Garden" is a new illustrated booklet by C. P. Halligan, published as Special Bulletin 228 of the Agricultural Experiment Station of Michigan State College.

A supplement to this bulletin contains a list of rock garden plants, compiled by C. E. Wilson, listed according to size, color,

how to plant, what exposure to give, and additional remarks, all in complete and comprehensive code.

* * * * *

In "Virus Diseases of Plants" in the April *Scientific Monthly* Dr. Melville T. Cook describes the variegated leaves of *Abutilon*, which have long been a subject of horticultural and scientific interest, and have been studied, among other places, at The New York Botanical Garden.

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Plant diseases reported by agents in every state in the union are listed in a mimeographed supplement to the *Plant Disease Reporter* published by the United States Department of Agriculture.

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"Common Forest Trees of Georgia" is a new booklet received by the Botanical Garden library.

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Specimens of *Echeveria pulverulenta* for which Clarence Elliott recently won an award of merit in England are described and shown in three striking photographs in *The Gardeners' Chronicle* for March 25. The plant grows wild in California.

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Dr. A. B. Stout of The New York Botanical Garden gives a preliminary report on the new hardy seedless grapes he has developed in coöperation with the State Experiment Station at Geneva, in *Science* for March 24. Twenty-eight seedlings have already been produced that are hardy in New York State, he says.

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A brief article in the March–April issue of *Mycologia* shows how a common field mushroom (*Agaricus arvensis*) pushed through an asphalt paving that had been laid two years before.

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In *American Forests* for April, John T. Gibbs tells how New York State in 1932 gave employment to 10,347 men at $198,122 in a reforestation program. More than 2,000 more worked on forest improvement, while others engaged in state parks brought the total to 25,000 unemployed men who were given work in these fields.

NOTES, NEWS, AND COMMENT

Dr. B. O. Dodge, Pathologist of The New York Botanical Garden, was elected a member of The National Academy of Sciences at the annual business meeting held in Washington, April 26.

Dr. Ludwig Diels, Director of the Botanical Garden and Museum at Berlin, Germany, visited The New York Botanical Garden, Saturday, April 15, upon his arrival in America as an invited guest of the Century of Progress Exposition in Chicago. He is now spending a month in botanical exploration in the southeastern states, and on his return will visit Washington and Boston, as well as spending some time in New York before going to Chicago about the middle of June.

Mr. Ivar Elvers, of the Department of Botany of the University of Stockholm, Sweden, also visited the Garden during the month, on his way to Berkeley, Calif., where he intends stopping for four months before proceeding to New Zealand and Australia, thence to the Botanic Garden of Buitenzorg, Java, where he will study.

"Botanical Features of Northern South America" was the subject of a lecture by Dr. H. A. Gleason before the New England Botanical Club in Boston, April 7.

Mr. Boris A. Krukoff sailed April 15 for Amazonian Brazil, where he will spend nine months making botanical collections and investigating certain problems connected with the forest resources of the Amazon Valley.

Meteorology for March: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 51° F. on the 4th; 54° on the 7th; *61° on the 17th;* and 52° on the 24th. The minimum temperatures were: 22° on the 6th; *15° on the 11th;* 24° on the 16th; 27° on the 25th; and 33° on the 29th and the 31st. The total precipitation for the month was 5.34 inches. One half inch of snow fell on the 2nd; one inch on the 19th and traces on the 26th and the 28th. This is figured in the total amount of rain as .15 inches.

ACCESSIONS

LIBRARY ACCESSIONS, APRIL 1-MAY 31, 1932 (continued)

EWART, ALFRED JAMES. *Flora of Victoria.* Melbourne, 1930.

FARRER, REGINALD JOHN. *The rock garden.* London, [1912].

FITZ GERALD, HENRY PUREFOY. *A concise handbook of climbers, trainers and wall shrubs.* London, 1906.

FLEMING, JOHN. *Spring and winter flower gardening: containing the system of floral decoration as practised at Cliveden.* London, 1864.

FORTUNE, ROBERT. *Yedo and Peking. A narrative of a journey to the capitals of Japan and China.* London, 1863.

FRANCHET, ADRIEN RENÉ. *Étude sur les Strophanthus de l' Herbier du Muséum de Paris.* [Paris, 1893].

FRASER, JOHN. *Select carnations, picotées, & pinks.* London, 1907.

FRESHFIELD, DOUGLAS WILLIAM, & MONTAGNIER, HENRY F. Horace-Bénédict de Saussure. Genève, 1924.

GAUTHIER-LIÈVRE, LUCIENNE EMILIENNE. *Recherches sur la flore des eaux continentales de l' Afrique du Nord.* [Alger] 1931.

GENTIL, AMBROISE. *Dictionnaire étymologique de la flore française.* Paris, 1923.

———. *Petite flore Maucelle.* Ed. 3. Le Mans, 1898.

GIBAULT, GEORGES. *Histoire des legumes.* Paris, 1912.

GLENNY, GEORGE. *The handy book on gardening.* London, 1871.

———. *The properties of flowers and plants.* Ed. 3, with additions. London, 1863.

GRATELOUP, JEAN PIERRE SYLVESTRE DE. *Cryptogamie tabellienne; ou, description succincte des plantes cryptogames qui croissent aux environs de Dax.* Bordeaux, 1835.

GRAY, ASA. *A handbook of the flowering plants and ferns of the central and northeastern United States and adjacent Canada; rearranged and extensively revised by Benjamin Lincoln Robinson and Merritt Lyndon Fernald.* New York, c 1908.

GUILLAUMIN, ANDRÉ. *Les fleurs de jardins.* 2 vols. Paris, 1929–30.

HAAS, PAUL, & HILL, THOMAS GEORGE. *An introduction to the chemistry of plant products.* London, 1913.

HADI, SAIYID MUHAMMAD. *The sugar industry of the United Provinces of Agra and Oudh.* Allahabad, 1902.

HAZLITT, WILLIAM CAREW. *Gleanings in old garden literature.* New York, 1887.

HIBBERT, SHIRLEY. *Brambles and bay leaves.* London, 1855.

HITCHCOCK, ALBERT SPEAR. *A manual of farm grasses.* Washington, 1921.

———. *Field work for the local botanist.* Washington, 1931.

HOARE, CLEMENT. *A practical treatise on the cultivation of the grape vine on open walls.* Ed. 3. London, 1841.

HOOKER, JOSEPH DALTON. *The student's flora of the British Islands.* Ed. 2. London, 1878.

HUMBERT, HENRI. *Végétation du Grand Atlas marocain oriental: exploration botanique de l'Ari Ayachi.* Alger, 1924.

HURRY, JAMIESON BOYD *The woad plant and its dye.* London, 1930.
JACOB DE CORDEMOY, HUBERT. *Recherches sur les Monocotylédones à accroissement secondaire.* Lille, 1894.
JANET, CHARLES. *Le Volvox. Deuxième et troisième mémoire.* Paris et Macon, 1922, 1923.
KNOBEL, EDWARD. *The grasses, sedges and rushes of the northern United States.* Boston, 1899.
KRÄNZLIN, FRITZ WILHELM LUDWIG. *Beiträge zur Orchideenflora Südamerikas.* Uppsala, 1911.
KUFFERATH, HUBERT. *La culture des algues.* Paris, 1930.
LA FONS, ALEXANDRE DE. *Calendrier de flore; ou, catalogue des plantes des environs de Noyon.* Noyon, 1829.
LEBOUR, MARIE VICTOIRE. *The planctonic diatoms of northern seas.* London, 1930.
LEIGHTON, WILLIAM ALLPORT. *The lichen-flora of Great Britain, Ireland, and the Channel Islands.* Ed. 3. Shrewsbury, 1879.
MCLAREN, JOHN. *Gardening in California; landscape and flower.* [Ed. 2.] San Francisco, 1924.
MAIRE, RENÉ CHARLES JOSEPH ERNEST. *Contributions à l'étude de la flore de l' Afrique du Nord.* Fasc. 1–18. Alger, 1926–31.
MARISSAL, FELIX VICTOR. *Catalogue des phanérogames observées depuis 1842 dans les environs du Tournay.* Tournay, 1846.
[MARSHALL, WILLIAM EMERSON]. *Consider the lilies.* Ed. 2. New York, [1932?] (Given by the author.)
MARTIN, HUBERT. *The scientific principles of plant protection.* New York, 1928.
MATSUURA, HAJIME. *A bibliographical monograph on plant genetics (genic analysis) 1900–1925.* Tokyo, 1929.
MESSEL, L. *A garden flora: trees and flowers grown in the gardens at Nymans, 1890–1915* London, 1918.
MIRBEL, CHARLES FRANÇOIS BRISSEAU. *Histoire naturelle, générale et particulière des plantes.* 18 vols. Paris, An X [1802]–1806.
MORRIS, DANIEL. *Plantes produisant le caout-chouc du commerce.* Tr. by Léon Pynaert. Bruxelles, 1899.
MOUSNIER, JULES. *Les champignons dans le département de la Charente—Inférieure.* Paris, 1873.
MOYNIER, L. PH. *De la truffe; traité complet de ce tubercule.* Paris, 1836.
MÜLLER, NIKOLAUS JAKOB CARL. *Atlas der Holzstructur dargestellt in Microphotographien.* Halle a. S., 1888.
NATIONAL DAHLIA SOCIETY. [*Publications.*] Place of publication variable. 1910–32.
NICHOLLS, HENRY ALFRED ALFORD. *Petit traité d' agriculture tropicale.* Tr. by E. Raoul. Paris, 1895.
NORMAN, JOHANNES MUSAEUS. *Specialia loca natalia plantarum nonnullarum vascularium & Characearum & Lichenum in agro arctico Norvegiae confiniisque sponte nascentium.* [Trondjem], 1868.

Nova acta Regiae Societatis scientiarum upsaliensis. Ser. 4. Vols 2, 3, 5, 6, Vol. extraord. Upsala, 1907–31.

OCHSE, J. J, & BAKHUIZEN VAN DEN BRINK, REINIER CORNELIS. *Vegetables of the Dutch East Indies.* Buitenzorg, 1931.

OWEN, T. C. *The cinchona planter's manual.* Colombo, 1881.

OWENS, CHARLES ELMER. *Principles of plant pathology.* c. 1924.

PARSONS, MABEL. *English house grounds;* text by Clarence Fowler; Eugene Clute, editor. New York, 1924.

PERCIVAL, JOHN. *Agricultural botany.* Ed. 5. London, 1918.

PEREIRA, JONATHAN. *The elements of materia medica and therapeutics.* Ed. 3. 2 vols. London, 1853.

PICTET, AMÉ. *La constitution chimique des alcaloïdes végétaux.* Paris, 1888.

PRADAL, E. *Catalogue des plantes cryptogames recueillies dans le département de la Loire-Inférieure.* Nantes, 1858.

Proceedings of the West Virginia Academy of Science. Vols. 1–5. Morgantown, 1926–31. (By exchange.)

QUINN, PATRICK T. *Money in the garden: a vegetable manual prepared with a view to economy and profit.* New York, 1871.

[RAPIN, DANIEL]. *Flore des plantes vénéneuses de la Suisse.* Payerne, 1849.

REHDER, ALFRED. *Manual of cultivated trees and shrubs hardy in North America.* New York, 1927. (Given by Mrs. E. S. Burgess.)

RIVERS, THOMAS. *The rose amateur's guide.* Ed. 3. London, 1843.

ROE, EDWARD PAYSON. *Success with small fruits.* New York, 1898.

ROYAL SOCIETY OF LONDON. *Catalogue of scientific papers. Fourth series (1884–1900).* Vols. 13–19. London, 1914–25.

RYDBERG, PER AXEL. *Flora of the prairies and plains of central North America.* New York, 1932.

SALMON, CHARLES EDGAR. *Flora of Surrey.* Ed. by William Harrison Pearsall. London, 1931.

SANDERS, *Orchid hybrids. Sanders' complete list.* Vol. 2, 1921–30. St. Albans, 1931.

SAUVAGEAU, CAMILLE FRANÇOIS. *A propos des Cytoseira de Banyuls et de Guéthary.* Bordeaux, 1912.

SCHELLE, ERNST. *Die winterharten Nadelhölzer Mitteleuropas.* Stuttgart, 1909.

SCHOMBURGK, MORITZ RICHARD. *Travels in British Guiana, 1840–1844.* Translated and edited by Walter E. Roth. 2 vols. Georgetown, 1922–1923.

SCHOMBURGK, ROBERT HERMANN. *Travels in Guiana and on The Orinoco during the years 1835–1839.* Translated by Walter E. Roth. Georgetown, 1931.

SCHROEDER, JOHN FREDERICK. *The intellectual and moral resources of horticulture.* New York, 1828.

SCHWARZ, FRANK. *Förstliche Botanik.* Berlin, 1892.

SEWARD, ALBERT CHARLES. *Plants, what they are and what they do.* Cambridge, 1932. (Given by Dr. E. D. Merrill.)

SEYMOUR, EDWARD LOOMIS DAVENPORT. *Garden profits: big money in small plots.* Garden City, 1911.

———. *The home garden.* Garden City, c 1917.

SMITH, HAROLD HAMEL, ED. *The fermentation of cacao with . . . the results of . . . investigations into the fermentation, oxidation and drying of coffee, tea, tobacco, indigo, etc., for shipment.* London, [1913].

SUDELL, RICHARD. *The town garden.* London, n. d.

TALBOT, WILLIAM ALEXANDER. *Systematic list of the trees, shrubs and woody-climbers of the Bombay Presidency.* Bombay, 1894.

THOMAS, HARRY HIGGOTT. *The amateur's week-end gardening book.* London, 1931.

TRELEASE, WILLIAM. *Plant materials of decorative gardening: the woody plants.* Urbana, 1917.

TROUVELET, BERNARD, & WILLAUME, FERNAND. *Manuel-guide des traitements, insecticides et fungicides des arbres fruitiers.* Ed. 2. Paris, 1927.

TROWELL, SAMUEL. *A new treatise of husbandry, gardening, and other matters relating to rural affairs.* London, 1739.

TULASNE, EDMOND LOUIS RENÉ, & TULASNE, CHARLES. *Selecta fungorum carpologia of the brothers L. R. & C. Tulasne;* translated into English by W. B. Grove: edited by A. H. Reginald Buller and C. L. Shear. 3 vols. Oxford, 1931.

VUILLEMIN, JEAN PAUL. *Les champignons parasites et les mycoses de l' homme.* Paris, 1931.

WARD, FRANCIS KINGDON. *Plant hunting on the edge of the world.* London, 1930.

———. *The riddle of the Tsangpo gorges.* London, 1926.

WATT, GEORGE. *A series of ledger records intended as a classified index to various works on Indian economic science.* Calcutta, 1884.

WEGUELIN, H. W. *Carnations, picotées & pinks.* Ed. 3. London, n. d.

WILLIAMS, BENJAMIN SAMUEL. *The orchid-grower's manual.* Ed. 4. London, 171.

WILLIS, JOHN CHRISTOPHER. *A dictionary of the flowering plants and ferns.* Ed. 6. Cambridge, 1931.

WITTMACK, MARX CARL LUDEWIG. *Botanik und Kultur der Baumwolle . . mit einem Abschnitt, Chemie der Baumwollpflanze von Stefan Fraenkel.* Berlin, 1928.

WOOD, ALPHONSO. *Class-book of botany.* New York, 1869.

ZELLER, HANNAH. *Wild flowers of the Holy Land;* with a preface by H. B. Tristram and an introduction by Edward Atkinson. London, 1880.

ZOPF, WILHELM. *Untersuchungen über die durch parasitische Pilze hervorgerufenen Krankheiten der Flechten.* Erste Abhandlung. Halle, 1897—Fortzetzung. Halle, 1898.

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Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than 1,500,000 specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 42,800 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestral subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

Contributions to the Garden may be deducted from taxable incomes.

The following is an approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ———.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

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JOURNAL
OF
THE NEW YORK BOTANICAL GARDEN

ARTHUR HOLLICK
N. L. BRITTON

NATIVE SHRUBS OF THE BOTANICAL GARDEN
JOHN K. SMALL

A DISPLAY GARDEN OF DAYLILIES
A. B. STOUT

"CURE IT WITH A GARDEN"
H. H. RUSBY

PUBLIC LECTURES DURING JUNE, JULY, AND AUGUST

ORNITHOGALUM THYRSOIDES AUREUM
T. H. EVERETT

NOTES, NEWS, AND COMMENT

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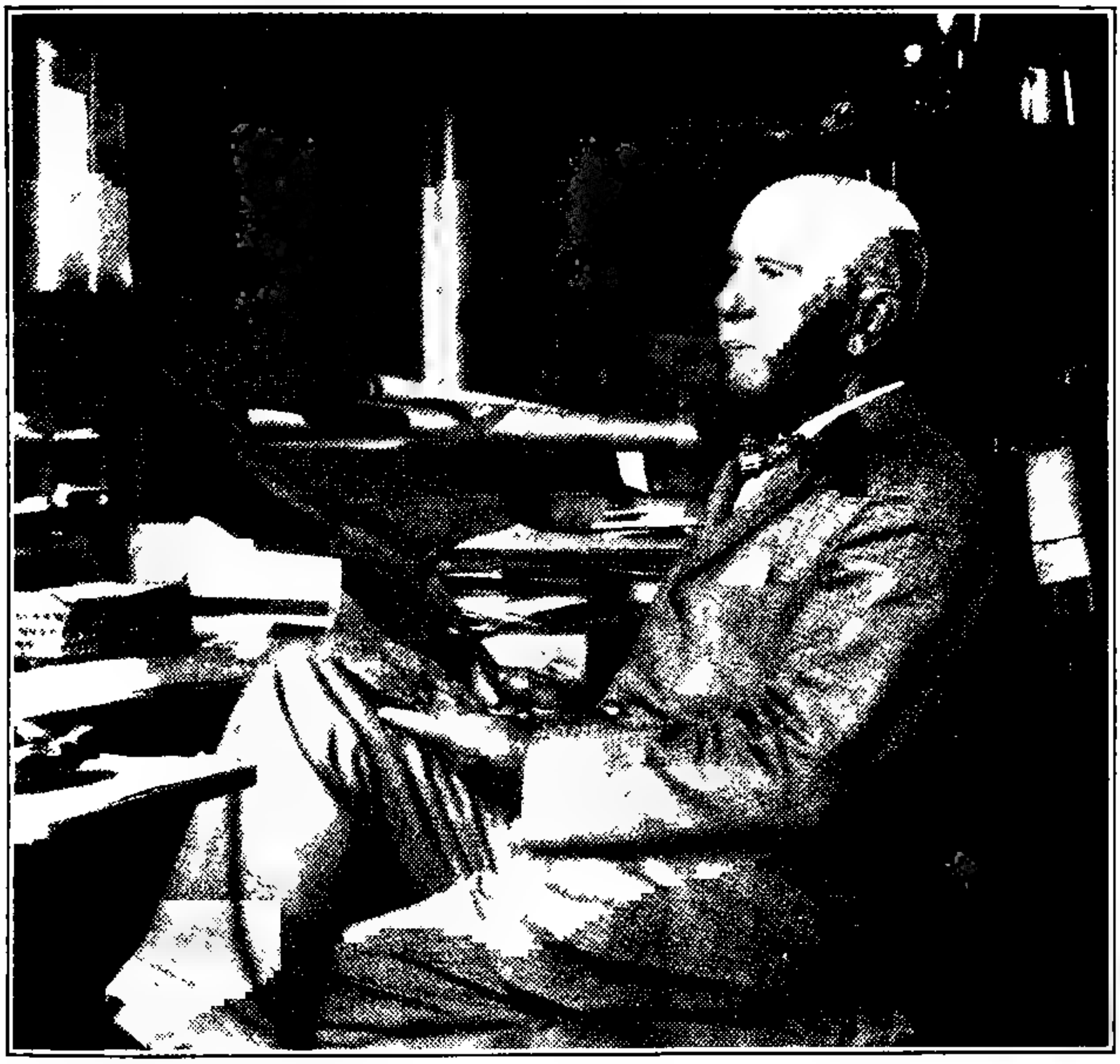
ARTHUR HOLLICK



ARTHUR HOLLICK
(From a photograph taken in his study at The New York Botanical Garden by Dr. E. E. Sherff, February 6, 1929.)

Doctor Arthur Hollick, in charge of the collections of fossil plants at The New York Botanical Garden since 1901, as a cu-

rator, and paleobotanist, died in New York on March 11, 1933, after a brief illness.

He was born at New Brighton, Staten Island, on February 6, 1857, and was named Charles Arthur Hollick, but early abandoned the use of the name Charles; he early developed fondness for natural history under the influence of his father, Doctor Frederick Hollick. I first knew him when we both entered the School of Mines of Columbia College in 1875; an intimacy and companionship was then established which continued until his death. Our youth was, for the most part, spent on Staten Island, his home being at New Brighton, mine at New Dorp; we studied local botany and geology under the delightful guidance of Professor John S. Newberry, and of his intimate friend Mr. John J. Crooke, who had formed a large natural history cabinet and library at his home at Great Kills. At their suggestion we joined the Torrey Botanical Club in 1877, and thus came into acquaintance with Doctor George Thurber, Mr. William K. Leggett, and Professor Alphonso Wood. Doctor Hollick was Recording Secretary of the Club from 1883 to 1888, and also an Associate Editor for many years.

Our Catalogue of the Plants of Richmond County (Staten Island) New York was published in 1879, the year of our graduation from the School of Mines, and was followed by several supplements. This catalogue has been posted up, enlarged by additional species detected by us and by other students, and by lists of the cryptogams; the manuscript is filed for reference in the library of the Staten Island Institute of Arts and Sciences, available for the use of students. His degree was Bachelor of Philosophy; elected Secretary of our Class Association, he served in this capacity until his death; he went to California later that year, and was engaged in mining there for a short time.

We became original members of the Natural Science Association of Staten Island in 1881, together with Mr. William T. Davis and other local naturalists; many specimens obtained by us were subsequently contributed to the museum and herbarium of that Society, later incorporated as The Staten Island Institute of Arts and Sciences; Doctor Hollick served as Secretary, and as Editor for many years, and was Director of the Institute's public museum from 1914 to 1919; his contributions to its publications,

numerous and varied, will be listed by Mr. Charles W. Leng in the Proceedings of the Institute.

From 1881 to 1891, Doctor Hollick was an Assistant Sanitary Engineer of the New York Board of Health, and gave expert sanitary aid to other cities; he served as a member of the Board of Health of New Brighton, Staten Island, 1886 to 1892; was President of the Boulevard Commission of Port Richmond, Staten Island, in 1896, and a member of the Richmond County Park Commission from 1897 to 1904.

In 1890 he was appointed a Fellow in the Geological Department of Columbia College, became Assistant in Geology in 1892, and Tutor in Geology from 1893 to 1901. Investigational work accomplished led up to the degree of Doctor of Philosophy, awarded him by the Columbian University of Washington in 1897. He served also, at intervals, as a member of the United States Geological Survey, classifying and describing collections of fossil plants, residing meanwhile at Washington.

The important Columbia University collection of fossil plants, formed for the most part by Professor Newberry, was deposited with The New York Botanical Garden in 1901, and installed in the basement of the museum building. Doctor Hollick was appointed an Assistant Curator of the Garden at that time, subsequently a Curator; the title of his position changed to Paleobotanist in 1921, and to Research Associate in Paleobotany in 1932. Supplemented by exchanges and by field work, large additions were made by him, partly to the University collection, partly to that of the Garden.

His field work was extensive, including collections of many fossil plants from the clays and sandstones of southeastern New England, Long Island, Staten Island and adjacent New Jersey, at intervals over a long period; in the autumn of 1882, he accompanied me, with Mr. William T. Davis, to Wyoming and Colorado, collecting fossil plants for Professor Newberry; he was associated with the Maryland Geological Survey for a time, in 1901, collecting and studying fossil plants, and his results were published by that Survey in 1906. In 1903 he made a noteworthy trip to Alaska, for the United States Geological Survey, in the valley of the Yukon River, traversing the river by canoe, and brought nearly a ton of fossil plants to Washington, which he sub-

sequently studied there. In the spring of 1908, he was with Mrs. Britton and me in Jamaica, aiding in collecting herbarium specimens, during our studies of the flora of that island.

In Porto Rico, he came as our guest for a month in 1926, to study and collect fossil plants on behalf of the Scientific Survey of Porto Rico and the Virgin Islands, under the auspices of The New York Academy of Sciences and the Government of Porto Rico; he described, and illustrated this collection, in the seventh volume of the Scientific Survey publications.

His last expedition was to Cuba, December 1932 and January 1933, under a grant from the O. C. Marsh Fund of the National Academy of Sciences, in company with Brother León, Professor in the College of La Salle, Vedado, Havana, and other Cuban students; they made very important collections of fossil plants, visiting all the Cuban provinces, traveling over 1000 miles. Doctor Hollick was studying these specimens, at the Garden, at the time of his fatal illness. His last letter to me was written from Holguin, Oriente, Cuba, January 4, 1933. The continuation of the study of this Cuban collection, and the publication of results has been undertaken by his long-time friend and correspondent, Professor E. W. Berry, of Johns Hopkins University.

In the course of his field work many species of plants, both fossil and living, new to science, and some new species of animal fossils, were obtained. A number of these have been named in his honor by other students; record of these will be made by Mr. Leng, in the Proceedings of the Staten Island Institute.

His published scientific contributions are numerous; the more comprehensive of these will be listed by Doctor Marshall A. Howe, in *Bulletin of the Torrey Botanical Club*.

He was an expert draughtsman, and illustrated all his own publications, some of those by Professor Newberry, and supervised, or made many of the drawings for the "Illustrated Flora of the Northern States and Canada." He was a member, or a fellow, of several learned societies.

He was married in 1881 to Miss Adeline Augusta Talkington, of Staten Island, who aided him much in his career, and survives him, with two married daughters.

N. L. Britton.

NATIVE SHRUBS OF THE BOTANICAL GARDEN

Their Origin and Migrations

The plant covering, herbaceous and woody, of The New York Botanical Garden area has doubtless gone through minor evolutions since the ice ages. All we may know definitely is the plant-population of today.

At present there are fifty kinds of native shrubs in the four hundred acres comprising the Botanical Garden in Bronx Park. According to our present knowledge, taxonomically considered, two classes, fourteen orders, twenty-four families, and thirty-three genera are represented in this frutescent assemblage.

The population of shrubs native to the region has been self-maintained during the three decades of the Garden's existence, although additional specimens of some of the species have been added in the course of building up the systematic plantations.

Some of the shrubs have been partly eliminated by vandalism and disease, but self sown seedlings have maintained the representation of the species.

Shrubs represent a group of the plant kingdom standing between herbs and trees in vertical development. They merge with the herbaceous group through the so-called under-shrubs such as trailing-arbutus and wintergreen, and with the arboreal groups through those that grow either as trees or typical shrubs, as in the case of various oaks, hollies, and willows. Like trees, shrubs may dominate a landscape. Trees may be impressive by the height of the single trunks; shrubs by a prodigious growth of myriad clustered stems. The one dominates by the vertical arrangement of the plant; the other by a horizontal development. The growth of shrubs viewed from a vantage-point may be just as impressive as a growth of trees. Besides being of the utmost importance to man from an esthetic and an economic standpoint, the shrub is necessary to the maintenance of a balanced plant covering. It helps to feed the tree and the herb by conserving the refuse from both of these associates. By its many stems it holds vegetable matter in position while it is being turned into humus, using some of the food for itself but giving much back to the tree and the herb.

Because of their distinctly secondary position, shrubs bear the burden of rendering a service to man as well as to nature. The

service to nature has been brought out in the preceding paragraph; that to man must be through their fruit for food or ornament, or through the beauty of their flowers or foliage. And these requirements are fulfilled, for shrubs are more prolific in flowers and fruits than any other woody plants. Since fruit-eating birds and mammals get the major part of their food from this source, the fruit of shrubs is of use to both animals and man. Such service is the watchword of the race of shrubs.

We venture to say that very few visitors to the Garden have considered the fact that a comparatively short time ago, geologically speaking, not a plant inhabited the four hundred acres comprising The New York Botanical Garden! During the ice ages not only was the vegetation that had developed previously on the area destroyed, but the soil in which the plants grew was doubtless pushed off the greater part of the rock foundation over which it had formerly accumulated or been deposited.

In post-glacial times, a forest developed in the devastated area. The number of shrubs and trees here has been greatly reduced since the discovery of America in the process of civilization. However, the number of kinds of shrubs represented here in recent geologic times equals that in the outlying regions which were not so much cleared off and not so densely settled by man.

The New York Botanical Garden occupies a middle ground between a boreal and a tropical region with climatic influences respectively cold and warm, or, in other words, at a point midway between the Gulf of Saint Lawrence, a thousand miles to the northeast, and the Gulf of Mexico, a thousand miles to the southwest. It will be interesting to see which floristic area the Garden shrubs favor.

The glacier extended from the far north down into the sea in the New England region, bisecting Staten Island and Long Island, with its ice-front skirting the southern side of the Great Lakes region and reaching westward near the Canadian boundary.

Vegetation just beyond the terminus of the glacier was subjected to chilling from the winds flowing southward and, at times, the force of cold floods of water from the melting of the ice. Doubtless the advance of the ice sheet was so slow that many plants were successfully influenced to migrate from north to south.

Seeds might easily have been carried in these winds and waters and possibly also scattered through the agency of birds and other animals which ate the fruits and seeds, and, in their retreat before the glacier, carried some species far to the south. It is probable that many plants were not preserved in either of these ways and so certain groups of plants dominant just before the first ice age are not represented in our present flora at all.

The plant-covering of the Atlantic coastal region of North America shows a relation to the major geologic formations. From New York, at sea level and slightly remote from the sea, to the northeast lies the New England Coast Province, which occupies a foundation of very old crystalline rocks.

The New England Coast Province ends southward as a wedge composed of the Bronx and of part of Manhattan Island. This wedge is flanked by two quite definite plant provinces, on the west by a very ancient geologic formation which comprises the Piedmont Province and on the east by a relatively very recent geologic formation which comprises the Coastal Plain Province. Prior to modern improvements in Manhattan, the lower end of this island and a part of the east side further north formed part of the Coastal Plain.[1]

When Henry Hudson sailed up New York Bay, Governor's Island was also Coastal Plain. In a future age this island may be a puzzle to geologists, for it is now largely made up of fill composed of a mixture of glacial drift and crystalline rocks derived from the subway excavations in Manhattan Island. We are safe in saying that not a direct descendant of the woody plants or herbs of the former Coastal Plain flora remains on Manhattan Island. Certainly none remains on Governor's Island. Several more or less undisturbed areas of the New England Coast Prov-

[1] The southern tip of Manhattan Island from 59th Street southward was Coastal Plain at the time of the discovery of America, or before modern improvements began. This section is for the most part covered with a coating of glacial drift and sandy deposits Just south of Central Park the elevation is about 60 feet above sea level, with a ridge of the same elevation extending southeastward to and slightly beyond the Grand Central Station. The eastern border of the island, extending for about one-half mile inland, and including the low-lying Harlem section, as noted on a topographic map, may also be included in the Coastal Plain area.—CHESTER A. REEDS.

ince remain on upper Manhattan, where a few native plants still persist.[2] The fourth major plant province of the eastern United States, also occupying an ancient geologic formation, the Blue Ridge, ends about two hundred miles southwest of The New York Botanical Garden.

The vegetation that clothed the area under consideration was evidently derived from the descendants of the plants that developed during the Cretaceous period. We have no direct evidence to substantiate this claim for the reason that whatever fossils may have accumulated thereabouts were ground up in the sedimentary rocks and swept away by the glacier. Fossil plants may be found in the masses of rocks in the moraines at the terminals of the glaciers, but it is not possible always to locate some of the original stations from which they were dislodged by the advance of the ice-sheet. However, we do have some circumstantial evidence in the undisturbed remains of fossil beds of the localities nearest to the moraines or former edges of the glacier, mainly those on the northern shore of Long Island. (See accompanying map.)

The vegetation of the Garden area may be considered in two broad divisions—pre-glacial and post-glacial. The former may be studied from the fossil plants preserved in the nearby deposits; the latter may be studied by the living plants.

The Garden is situated on the crystalline rocks of very great age. Much later, during the Cretaceous period, this region was evidently well populated with plants, for in the nearby fossil Cretaceous deposits more than one hundred species of woody plants have thus far been found.

The exposed crystalline rocks, at the beginning of the Cretaceous period, extended from the north to about what is now the southern New England and New York shore line. From the edge of this older foundation southward the débris of erosion of the Cretaceous was deposited. As the glaciers passed over the region now occupied by the Garden, all previous deposits were swept off

[2] The only places left on Manhattan Island where the native flora is left are Inwood Park, Fort Washington Park, High Bridge Park, and the area from about 185th Street to Dyckman Street, between Broadway and Riverside Drive. Central Park, Morningside Park, and Mount Morris Park have some native trees and a few of the hardiest woodland plants left. Even these few spots are being rapidly destroyed by park developments.—EDWARD J. ALEXANDER.

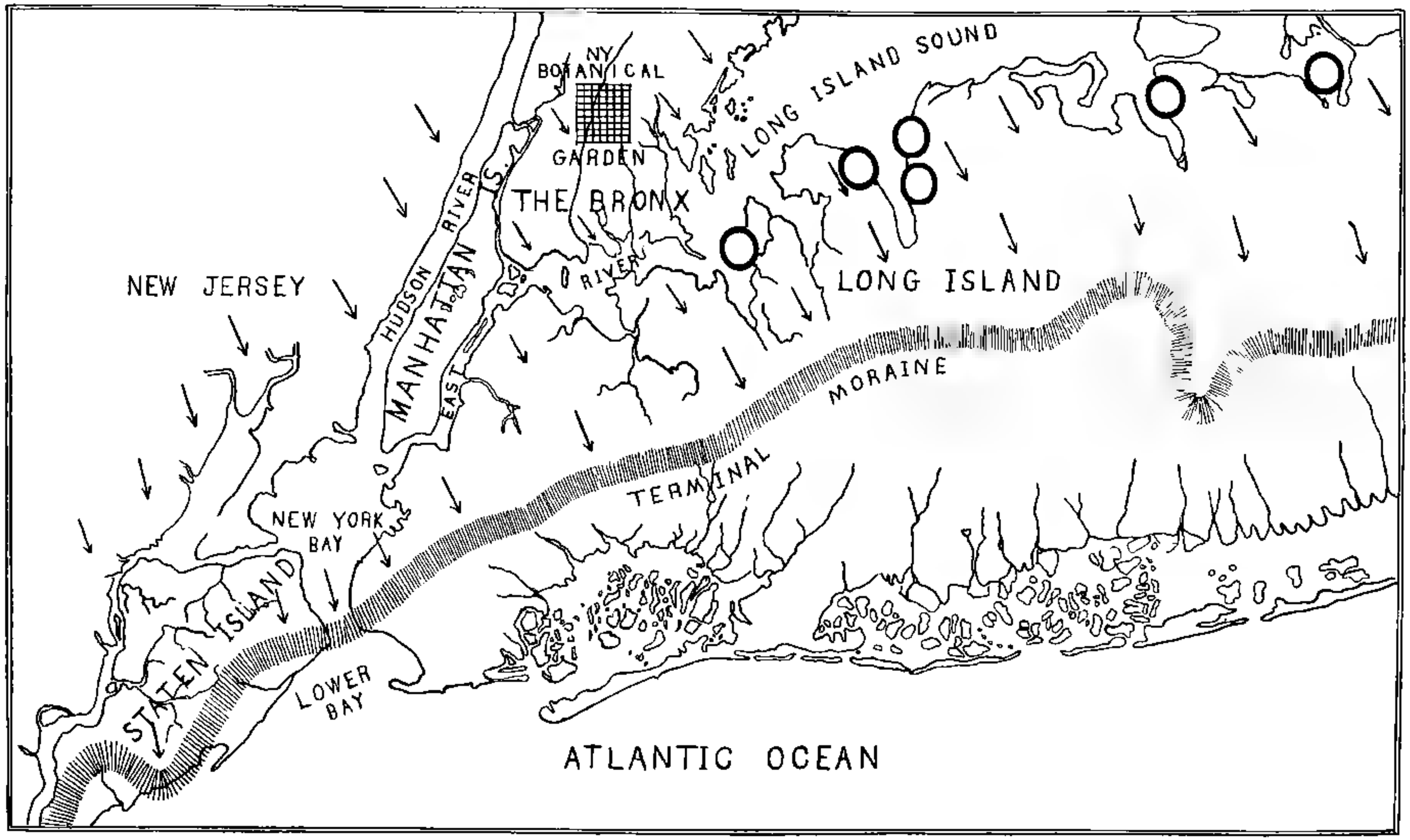


FIGURE 1. Map of the metropolitan area of the City of New York. The flow of the glacial ice is indicated by the small arrows. The outer terminal moraine on Staten Island and on Long Island is shown in hachure. The six outcrops of the Cretaceous formation on the northern shore of Long Island are indicated by circles.

the older rocks. As the ice passed over the edge of the ancient rock formation, it scoured out Long Island Sound, pushed the deposits that had accumulated there out to what is now the backbone of Long Island, and, for the most part, either destroyed or buried the Cretaceous deposits under the débris brought from further north by the ice-sheets. However, a few outcrops of the Cretaceous remain, at points indicated on the accompanying map. From the fossil plants preserved in these deposits and from those found in the débris made up of the materials of the same geologic period, we have a good key as to the character of the pre-glacial vegetation of the Garden area and the surrounding country.

The fossil flora of the Cretaceous has been made a special study by the late Dr. Arthur Hollick. The results of Dr. Hollick's researches have been published under the title "The Cretaceous Flora of Southern New York and New England."

The fossil plants, as far as identified, show us that both cone-bearing and fruit-bearing woody plants were in the old floral make-up. Some of these plants are now wholly extinct. Among the gymnosperms four genera no longer exist. Among the cone-bearers there was one representative of the Cycad family, a group now not represented on the Atlantic seaboard within a thousand miles of latitude. About a dozen and a half genera of angiosperms, or fruit-bearing plants, failed to reassert themselves in post-glacial times.

Fossil specimens from the nearby Cretaceous deposits indicate that at least thirty-eight genera of woody plants had representatives hereabouts before the ice-ages. Half of these did not reassert themselves locally in the reconstruction, although they still have representatives in the New World or in the Old World, or in both. Six of these, at least, are no longer represented in the Western Hemisphere. These are the cone-bearer *Dammara* and the fruit bearers *Cinnamomum*, *Laurus*, *Pistacia*, *Paliurus*, and *Eucalyptus*. The others contain species in either North or South America. They are the cone-bearer *Sequoia* and the fruit-bearers *Ficus*, *Persea*, *Ocotea*, *Tymenaca*, *Dalbergia*, *Elaeodendron*, *Sapindus*, *Zizyphus*, *Sterculea*, and *Myrsine*.

The pre-glacial remains indicate for the Garden area and vicinity species of the genera *Pinus*, *Juniperus*, *Populus*, *Salix*, *Myrica*, *Juglans*, *Quercus*, *Liriodendron*, *Magnolia*, *Platanus*, *Rhus*, *Acer*,

Ceanothus, Sassafras, Aralia, Kalmia, Andromeda, Diospyros, and *Viburnum.* A half dozen herbaceous genera are indicated along with the fossils of woody plants, but the record of herbaceous species is evidently very incomplete, owing, no doubt, to the less firm tissues of this class of plants and, in consequence, to the little likelihood of their preservation as fossils.

Among the present woody plants of the Garden there are about thirty-three genera additional to the pre-glacial fossil record. These discrepancies can be accounted for in two ways. Either the fossil record is incomplete or the additional genera developed in the floristics after the period of the ice-ages. Be that as it may, we know there was a reconstruction of the flora and floristics hereabouts, beginning with the retreat of the ice-sheet northward. The retreat of the vegetation southward as the ice-sheet advanced from the north was far-reaching. The effect of the cooling climate was evidently felt all the way down to the Gulf of Mexico.

It is safe to assume that the southward advance of the ice had three fundamental effects on plants. (I) It exterminated vegetation north of the moraines and also some of that contiguous to the moraines that could not migrate southward evidence: fossil flora. (II) It made surviving vegetation between the moraines and the Gulf of Mexico more resistant to cold evidence: many plants of northern Florida and some, even from as far south as Cape Sable in Florida, are hardy up to the latitude of southern Canada. (III) It caused a general southward migration of plants—evidence: the many northern types of plants in the southern Coastal Plain, Piedmont, and Blue Ridge, associated with southern types of vegetation. Changes and destruction had been wrought for a time between the moraine and the Gulf. When the ice-sheet began to retreat and finally disappeared, existing boreal conditions were established, but plants remained neither northward nor directly westward.

The southern regions alone remain to be considered as the plant reservoir which supplied the new floristics. A glance at the accompanying table of the shrubs now native in the Garden will show the southward geographic distribution of the species as now known. It should be noted that in addition to the shrubs cited in the accompanying table, there is a native grape on the grounds, perhaps *Vitis aestivalis,* and also two or three blackberries of uncertain relationships.

Shrubs Native in the New York Botanical Garden	Southern Limit					Northern Limit
	Fla.	Ga.	S. C.	N. C.		
Smilax glauca	×					Mass.
Smilax rotundifolia	×					N. S.
Salix sericea				×		N. B.
Salix petiolaris				×		N. B.
Salix discolor				×		N. S.
Cerothamnus carolinensis	×					N. B.
Comptonia peregrina		×				N. B.
Corylus americana		×				Me.
Alnus rugosa	×					Me.
Clematis virginiana	×					N. S.
Hydrangea arborescens	×					N. Y.
Hamamelis virginiana	×					N. S.
Rubacer odorata		×				N. S.
Rubus occidentalis		×				N. B.
Rubus strigosus			×			Lab.
Rubus setosus				×		Newf.
Rubus ostryifolius	×					Mass.
Rubus Enslenii	×					Mass.
Rosa palustris	×					N. S.
Rosa carolina	×					N. S.
Padus nana		×				N. S.
Toxicodendron radicans	×					N. S.
Rhus hirta		×				
Rhus glabra	×					Me.
Ilex verticillata	×					N. S.
Celastrus scandens		×				Me.
Euonymus americanus	×					N. Y.
Ceanothus americanus	×					Me.
Parthenocissus quinquefolia	×					Que.
Opuntia Opuntia		×				Mass.
Benzoin aestivale	×					Me.
Svida Amomum	×					Newf.
Svida femina		×				Me.
Svida stolonifera						
Cynoxylon floridum	×					Me.
Aralia racemosa		×				N. B.
Clethra alnifolia	×					Me.
Azalea nudiflora	×					Mass.
Kalmia latifolia	×					N. B.
Epigaea repens	×					Newf.
Gaultheria procumbens		×				Newf.
Gaylussacia baccata	×					Newf.
Vaccinium corymbosum	×					Me.
Vaccinium vacillans		×				
Cephalanthus occidentalis	×					N. B.
Sambucus canadensis	×					N. B.
Viburnum acerifolium	×					N. B.
Viburnum dentatum	×					N. B.
Viburnum Lentago		×				Que.
Viburnum prunifolium		×				Conn.

These shrubs all appear in the intervening territory, which includes Virginia, West Virginia, Maryland, Delaware, Pennsylvania, and New Jersey

A desert waste was left where the sheet had covered and scoured the surface of land. Then there was a period of general but gradual reconstruction of the vegetation in the southeast. After the tension was removed at the north, both northern and southern types of plants readjusted themselves to the changed temperatures, and repopulated the areas where vegetation had been depleted or destroyed by migrating northward. The accompanying table will show where these shrubs, by rearranging their geography east of the Blue Ridge after the ice ages, may now be found. Unless the species of the shrubs now native in the Garden had southern distribution in pre-glacial time (as now indicated) the great majority of them traveled to the southern limit—the shores of the Gulf of Mexico—during the ice-ages, and maintained the ground they gained up to the present time. Thirty species, or 60 per cent of those native in the Garden, grow naturally in Florida and the intervening states. Forty-four, or about 82 per cent, occur as far south as Georgia. Forty-five, or about 90 per cent, now occur as far south as South Carolina, and forty-nine,or 98 per cent, as far south as North Carolina.

This state of affairs represents the present distribution of the shrubs native in the Garden area in the region paralleling the Atlantic Ocean. The distribution of these shrubs when the ice-sheet receded and the subsequent evolutions through which they have passed we may never know fully. However, discoveries of Pleistocene plant-remains are constantly adding to our knowledge. All or nearly all the shrubs may have reached the southern limit at the beginning of the reconstruction, and the one-time advance guards of those just mentioned may have fallen back northward as the weather became warmer at the north. Hence the irregular distribution of the present age.

The great majority of our shrubs—twenty-seven species—are single representatives of their respective genera. Four genera *greenbriers, roses, sumacs,* and *blueberries*—have two representatives each, while two genera—*willows* and *dogwoods*—embrace three; one genus—*arrow-woods*—has four, and another genus - the *raspberry-blackberry* group—has five to its credit.

The Gulf of Mexico region has had a comparatively long and warm history. It has had an abundance of soil, usually deep, in some places fathomless. The Gulf of Saint Lawrence region has

had a cool and comparatively short history. It has had comparatively little soil and in many regions bare rock. This latter condition is reflected in the relatively small number of native woody species there represented, as compared with the great number of the southern gulf. However, about the same number of the native woody plants of The New York Botanical Garden are represented in or near the two Gulf regions, but not the same species. In the north the conifers, poplars, and birches are better represented.

So, if the glaciated region in which the Garden is situated was supplied from the southern plant reservoir, as it seems to have been, about thirty kinds of shrubs migrated northward beyond the latitude of the Garden and finally reached the Gulf of Saint Lawrence.

New York, it has been pointed out, lies midway between the two great gulfs which largely determine the ultimate limits of plants northward and southward. What might have been the floristics of the Garden tract had not the glacier played its part in destruction and reconstruction we do not know. We do find that the present flora has a strong southern, even a Gulf State flavor. Moreover, we find the northern pines, the spruces, the firs, the northern willows, and northern birches, wanting in the Botanical Garden area.

Furthermore, as in the case of the native trees of the Garden, the native shrubs savor strongly of the south, even of Florida. This condition, brought about largely through the conditions obtaining during the ice-ages, is partly maintained by another factor very often overlooked. New York, considered as a geographic point, does not lie very far north. One is apt to think of it, casually or habitually, in terms of the latitude of London, of Berlin, and of other northern European points; but actually it should be considered, as far as latitude is concerned, in relation to Madrid, Rome, and Istanbul (Constantinople), and about two hundred miles further south than the French Riviera. The relative southern latitude of New York is strongly reflected in the native flora of the Botanical Garden and its vicinity.

JOHN K. SMALL.

A DISPLAY GARDEN OF DAYLILIES

A collection of daylilies (*Hemerocallis*) has recently been planted in The New York Botanical Garden, which includes plants of the known species of this genus, more than 100 named horticultural clons, and numerous hybrids produced in experimental breeding at the Garden. The site of this special display is on the slope to the northwest of the Museum Building and in a direction slightly to the rear of it and it faces the main highway almost opposite the juncture of the entrance from Mosholu Parkway. Here this garden will enliven a long stretch of green lawn with masses of color during most of June, July, and August.

The accompanying figure shows the arrangement of this garden

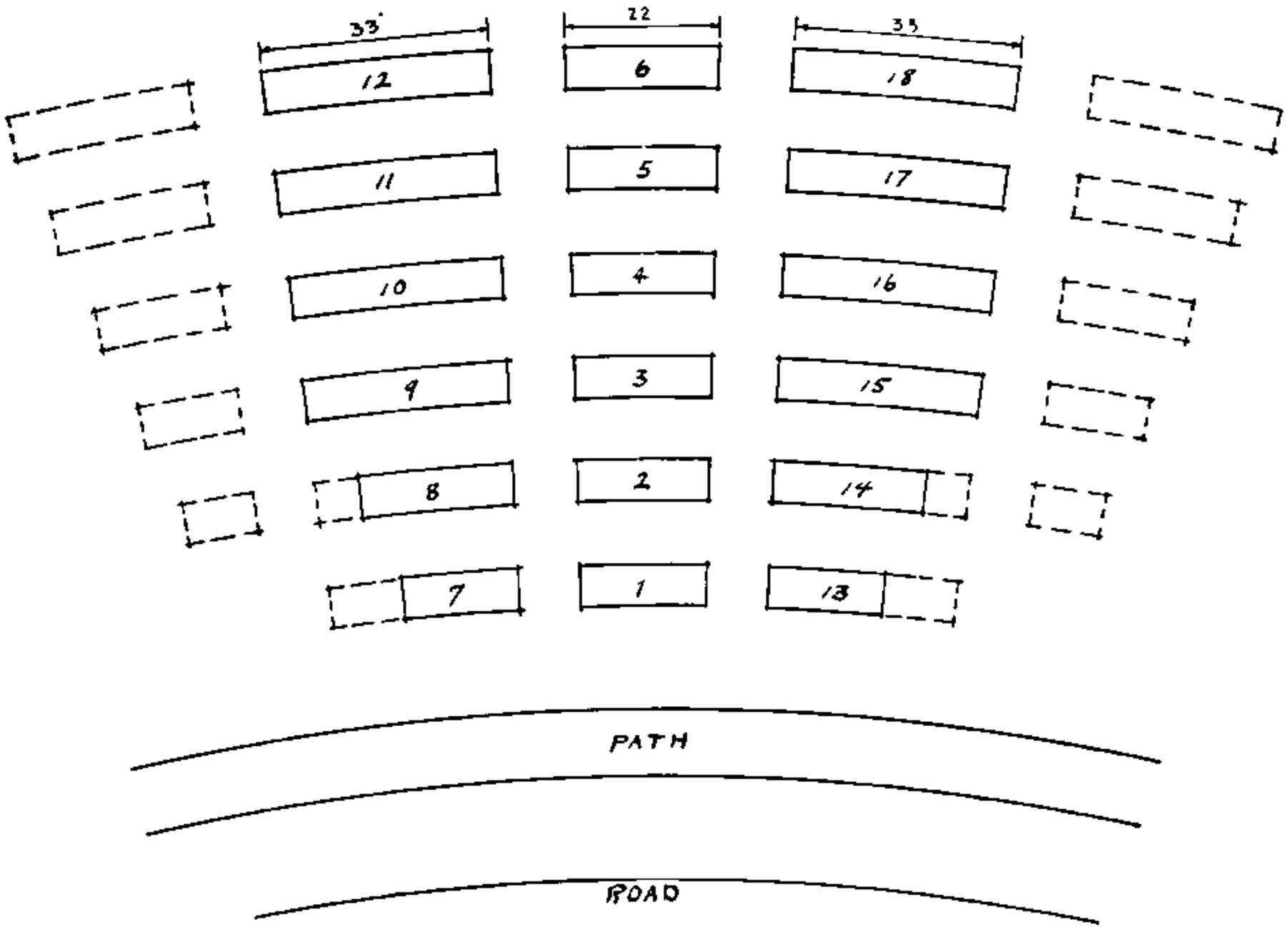


FIGURE 1. Plan of the display garden of daylilies.

of daylilies. In the present planting there are six tiers of beds arranged in three radiating sections. Two additional sections and extensions to certain of the beds, indicated in the plot by broken lines, may be planted later. The lines of the tiers are slightly curved to conform to the curb-line of the highway which they face. The length of the beds in each section increases from the

front to the rear and the ends of the beds form broken radiating lines which are parts of radii of the concentric arcs which the lines of the tiers form. The straight lines are hence not parallel. This arrangement gives a compact grouping and allows definite arrangements for ready comparison, which are desired features in a display which is primarily educational. But the variations in the size of the beds and the alignments combine to give a more pleasing effect than when the same number of square or rectangular beds are evenly spaced. Also the plan conforms to the contours of the site, which slopes gently from rear to the front and from the sides to the line of the central row, which forms the axis of the garden.

The central section of six beds (nos. 1–6) is planted with species and botanical varieties. One lateral section (beds 7 to 12) contains horticultural clons and the other section now planted (beds 13 to 18) contains hybrid seedlings. In the grouping of these plants consideration has been given to landscape effects and color values. The low-growing early-flowering plants are in the front tier of beds and the taller and late-flowering sorts are in the rear beds. In the long dimension of each bed there are three ranks of plants with the lowest in the front. There is also grouping according to color; the three beds at the rear are planted chiefly with fulvous daylilies. As the plants become established and reach full stature, various features of the arrangement will be studied and changes made to obtain the most effective grouping within each bed and for the collection as a whole. In most cases large clumps of plants have been used which provide this year masses of foliage and flowers and which rather fill the various beds.

The species represented are *Hemerocallis flava, H. fulva, H. minor, H. Dumortierii, H. Middendorffii, H. aurantiaca, H. Thunbergii, H. citrina, H. Forrestii, H. nana, H. plicata,* and *H. multiflora.* Besides the types first brought into cultivation there are for several species other types obtained directly from China and Japan, which present variations within the species. For *Hemerocallis fulva* there are wild plants from several widely separated localities, which include the varieties *H. fulva longituba* and *H. fulva rosea.* There are also in considerable number plants raised

from seed collected from wild plants which do not conform closely to any of the named species.

The horticultural clons are mostly of hybrid origin. In a few cases these plants were given names of the rank of true botanical varieties. The list of horticultural clons now planted in this collection is as follows: Ajax, Amaryllis, Apricot, Aureole, A. H. Austin, Bardeley, Baroni, Bay State, Anna Betscher, Bijou, E. A. Bowles, Burbank, Byng of Vimy, Calypso, Cissy Giuseppe (Chocolate Soldier), Cinnabar, Citronella, Corona, J. A. Crawford, Cressida, Dawn, Dwarf Yellow, Eldorado, Erica, Estmere, Flamid, Florham, Framingham, George Yeld, Golconda, Gold Dust, Gold Imperial, Gold Standard, Golden Bell, Golden Dream, Goldeni, Golden West, Gypsy, Harvest Moon, Lady Fermoy Hesketh, Hippeastrum, Hybrida Semperflorens, Hyperion, Imperator, B. Ladham, Lemon King, Lemon Queen, Lemona, Lovett's Lemon, Lovett's Orange, Luteola, Luteola Grandiflora, Luteola Major, Mandarin, Mrs. James R. Mann, Marigold, Middendorffiana, Mikado,. Miranda, Modesty, Mulleri, Nocerensis, Ochroleuca, Ophir, Orange, Orange Gem, Orange Glow, Orangeman, Orange Vase, Parthenope, Gladys Perry, Iris Perry, Marcus Perry, Margaret Perry, Mrs. Perry, Perry's Pigmy, Thelma Perry, Queen Mary, Queen of May, Radiant, Dr. Regal, Revenge, Rose Queen, Royal, Shirley, Sirius, Sir Michael Foster, Soudan, Sovereign, Sunny West, Sunset, Tangerine, The Gem, Taplow Yellow, Vesta, Viscountess Byng, Vomerensis, Wau-Bun, Winsome, Donald Wyman, Mrs. W. H. Wyman, and Yellow Hammer. The newly named varieties Taruga, Charmaine, and Theron are for the present to be seen in the experimental plots but they will soon be represented in the display garden.

The cultivated clons which belong in the species *Hemerocallis fulva* are planted in bed 12 and these include plants of the Europa Daylily obtained from several different countries, the clon called "The Saracen" which appears to be identical with the Europa Daylily, the Maculata Daylily, and the double-flowered clons known as Kwanso, Flore Pleno and Variegated. All of these are triploid and obviously horticultural types. There is also the *H. fulva* clon Cypriani.

The section devoted to hybrid seedlings produced at the Botanical Garden includes (1) first-generation hybrids of many com-

binations between species, (2) typical plants of later generations which illustrate the ranges of variation for various hybrid progenies, and (3) many hybrids that are ranked as excellent and of possible merit for culture as garden plants. One bed (no. 17) is filled with hybrids that have *Hemerocallis multiflora* as one parent. Bed no. 18 is planted with hybrids having some type of *H. fulva* in the parentage and which have a robust habit of growth and mostly flowers in fulvous colors. In general this section demonstrates in living plants the results that are obtained in hybridizing daylilies and the effectiveness of continued selective breeding in the development of new types of daylilies of value in floriculture.

The assemblage of species, named varieties, and wild plants in this collection of daylilies has been in active progress since 1921. A few plants have been purchased, but only from three nursery firms in Europe. All other plants have been donated to the Garden.

The nursery firms and growers who list plants for sale that have contributed living plants, mostly species and clons of the types in cultivation, are as follows: Amos Perry, Enfield, England; Bay State Nurseries, North Abington, Massachusetts; Bristol Nurseries, Bristol, Connecticut; Carl Purdy, Ukiah, California; Fairmont Iris Gardens, Lowell, Massachusetts; John Lewis Childs, Flowerfield, Long Island, New York; Farr Nursery Co., Weiser Park, Pennsylvania; Franklin Mead, Fort Wayne, Indiana; Lovett's Nursery, Inc., Little Silver, New Jersey; Midwest Gardens, Washington, Nebraska; Mt. Desert Nurseries, Bar Harbor, Maine; R. and J. Farquhar Co., Boston, Massachusetts; Willy Müller, Hortus Nucerensis, Naples, Italy; and Yokahama Nursery Co., Yokahama, Japan.

Botanical gardens that have supplied plants and in some cases also seeds of species include the following: Royal Botanic Gardens, Kew, England; Royal Botanic Gardens, Edinburgh, Scotland; The Gardens of the Royal Horticultural Society at Wisley, England;[1] Botanic Garden of the Université de Strasbourg, France; Botanical Garden of the U. S. S. R. Academy of Sci-

[1] Various of the plants thus obtained were sent by permission of nursery firms that had supplied the plants for trial and display at Wisley. Several new varieties introduced by Barr and Sons were thus obtained.

ences, Leningrad, U. S. S. R.; Botanical Institute, Tokyo Imperial University, Tokyo, Japan; and Botanic Garden, Harvard University, Cambridge, Massachusetts.

Various persons not connected with the firms and institutions mentioned above have supplied plants or seeds or both plants and seeds which they collected or obtained in various sections of Japan, China, and Manchuria. Of these mention should be made of the following: Mr. T. Susa, Director Aomori Agricultural Experiment Station, Kuroishi, Aomoriken, Japan; Dr. Albert N. Steward, University of Nanking, Nanking, China; Mr. H. H. White, formerly of the Presbyterian Missions; Professor Y. Kikazaki, Saitama Agricultural Experiment Station, Urawa, Japan; Mr. W. P. Hsieh, Chengtu University, Chengtu, Szechuen, China; Dr. Arthur Jacot, Shantung Christian University, Tsinan, China; and Mr. A. D. Woeikoff, Director, Echo Experimental Farm, Tieh-ling-ho, Manchuria.

To all these and to various persons connected with the firms and institutions mentioned the writer is personally much indebted for the help and assistance which has made this collection of living plants of *Hemerocallis* possible. It is without doubt the most complete collection of these plants thus far assembled.

Gardeners may visit this garden of daylilies, observe and compare the different species and the named horticultural clons, and make their own decisions regarding the merits of the daylilies and the selection of those that are most desirable for culture.

A. B. Stout.

"CURE IT WITH A GARDEN"[1]

This book, replete as it is with information and advice for the novice in gardening, and with valuable suggestions for the more experienced, will be chiefly regarded by some readers as a gem of English literature. Not since the appearance of Charles Dudley

[1] Robbins, Leonard H. Cure it with a garden. Pp. 175. Houghton Mifflin Company, Boston and New York. 1933.

Warner's "My Summer in a Garden," have we had anything at all like it, this resemblance being in the humorous features of the two books. Humor is perhaps Mr. Robbins' predominating sense, and it is a humor of rare quality. We doubt if in all his writings there occurs any suggestion that can have caused a heartache. His humor is genial and kindly and the subject of his animadversions can only smile with him. We can even imagine the plants themselves chuckling, if they could read his comments on their frailties, shortcomings, and general waywardness. As the gardener enjoys the fun of the situations depicted, he absorbs knowledge that is to save him from mistakes which he recognizes as his very own.

Mr. Robbins' opening chapter, in which he compares the gardening undertaking with a stock market adventure, is perfect in every detail and brings the gardener out a winner.

Nowhere else have we seen the charm of our flowers so fascinatingly depicted. As we read, we wonder why we have not appreciated our favorites more highly, and we drop the book and hasten out to look at our spring beauties, trying to see something in them that we have not seen before.

The author's "Pageant" of the flowers is a motion-picture in words. Everything slips before us in correct order and proper dress, from the pussy willow that "show its fuzzy semaphore," thus making known "that the door-yard pageant is about to be gin," till the brave endurance of the chrysanthemum fails and "at last the snow-white curtain falls." "Cure it with a Garden" is well calculated to broaden the view, cultivate the taste, enhance appreciation and, withal, to guide the gardener to success in an undertaking that is beset with difficulties and pitfalls. The final chapter, of eleven pages, is devoted wholly to "Maxims," by an imaginary Mr. Timkins, in which the most important principles and rules of the gardener's art are succinctly presented.

We shall be greatly mistaken if this book does not find a place on the "ready reference" shelf of very many country homes.

H. H. Rusby.

PUBLIC LECTURES DURING JUNE, JULY, AND AUGUST

Following is the program of free illustrated lectures to be given during the summer of 1933 in the Museum Building of The New York Botanical Garden on Saturday afternoons, beginning at 3:30; late-comers are admitted at 3:45.

June 3. "Palms of Florida," Dr. H. Beaman Douglass, Physician.

June 10. "Rocky Mountain Forests," Dr. Forman T. McLean, Supervisor of Public Education.

June 17. "Summer Wild Flowers," Dr. John Hendley Barnhart, Bibliographer and Administrative Assistant.

June 24. "Exploring for Plants in the Neighborhood of New York City," Mr. Raymond H. Torrey, Torrey Botanical Club.

July 1. "Ferns and Fern Allies," Dr. Albert C. Smith, Associate Curator.

July 8. "Daylilies," Dr. A. B. Stout, Director of the Laboratories.

July 15. "Westchester County Parks," Mr. Herman W. Merkel, Superintendent of Parks, Westchester County, New York.

July 22. "Rock Garden Plants," Mr. T. H. Everett, Horticulturist.

July 29. "Botanizing in Florida," Mr. Harold N. Moldenke, The New York Botanical Garden.

August 5. "Mushrooms, Edible, Poisonous and Otherwise Interesting," Dr. Fred J. Seaver, Curator.

August 12. "Botanical Pioneers of the Orient," Dr. Elmer D. Merrill, Director-in-Chief.

August 19. "Some Botanical and Geological Features of Wisconsin," Dr. B. O. Dodge, Plant Pathologist.

August 26. "Floral and Scenic Features of the Panama Canal Zone," Dr. Marshall A. Howe, Assistant Director.

ORNITHOGALUM THYRSOIDES AUREUM

Bulbs of the fine golden-yellow variety of the South African "Chinkerichee" have only recently been made available to gardeners, and during the early months of the present year this subject bloomed for the first time at The New York Botanical Garden.

Ornithogalum thyrsoides aureum has, by some authorities, been regarded as a distinct species and is figured as such in the *Botanical Magazine*, plate 190. It is a handsome thing, although not so robust in habit as the type. The glossy leaves are broadly strap-shaped, tapering to a point. At flowering time they are quite short, but they lengthen somewhat as they mature. The scapes are about one foot in height, and each carries several bright golden-yellow flowers which remain in good condition over a long period. The largest individual flowers measure two inches in diameter.

Eight bulbs in an eight-inch pan provide a well-furnished appearance, and they thrive in a light, rich soil if given adequate drainage. The bulbs should be potted in the fall and kept moderately dry at first, but as growth advances the supply of water may be increased. When the flower scapes commence to push upward, the plants will benefit from weekly or semi-weekly applications of dilute manure-water. Bulbous plants of this kind do not, as a rule, respond to artificial fertilizers. A cool- or intermediate house temperature is required for best results and full exposure to sunshine is essential. After flowering, feeding should be continued until growth ceases. As soon as the leaves commence to yellow and signs are evidenced that the resting season is at hand, the water supply should be gradually reduced and finally withheld entirely. Throughout the dormant season the bulbs should remain in the soil, the pots being stored in a sunny greenhouse or frame. Repotting must receive attention before growth begins in the fall.

Ornithogalum thyrsoides aureum is a splendid greenhouse plant and offers great promise as a subject suitable for window-garden culture. The bulbs grown at the Garden were received through the generosity of the firm of John Scheepers and Company of New York.

T. H. Everett.

FIGURE 1. A golden-flowered Ornithogalum, *O. thyrsoides aureum*, which has only recently been introduced to gardeners. In its native South African home it is known as "Chinkerichee."

NOTES, NEWS, AND COMMENT

A Conference of the Scientific Staff and Registered Students of the Garden was held on the afternoon of April 14, at which time the following program was presented: (1) "Further studies on possible sex hormones" by Miss Alice Aronescu, (2) "Malayan-Polynesian gymnosperms" by Dr. E. D. Merrill, and (3) "The breeding of seedless grapes" by Dr. A. B. Stout.

Dr. E. D. Merrill, Director-in-Chief of The New York Botanical Garden, is attending the Fifth Pacific Science Congress, which is being held in Victoria and Vancouver, B. C., June 1–14. He is one of the official delegates from the United States, appointed by Secretary of State Cordell Hull, with the approval of President Roosevelt. He represents also the American Philosophical Society, the Botanical Society of America, the National Research Council and the National Academy of Sciences, as well as the Botanical Garden. Previous meetings of this Congress have been held at Honolulu (1920), Sydney and Melbourne (1923), Tokyo (1926), and Batavia, Java (1929). Dr. Merrill was in attendance at the first two of these meetings.

A microscope once used by a surgeon on a convict ship traveling to Australia has been added to the historical collection of microscopes on exhibit in the Museum Building at The New York Botanical Garden. Originally a gift to the Public Museum of the Staten Island Institute of Arts and Sciences, the instrument has been presented to the Botanical Garden upon authorization of Arthur A. Michell, whose grandfather owned and used it a century ago. While the date of the microscope is not definitely known, it is said that the transportation of convicts ceased in 1839. The instrument, which is of early design, is accompanied by numerous slides and attachments, and is in its original box. The offer of the gift was made by Charles W. Leng, Director of the Staten Island Museum, after a talk given by Robert Hagelstein, an honorary member of the Garden's staff, before the New York Microscopical Society, in which attention was directed to The New York Botanical Garden's important collection of historical microscopes.

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THE NEW YORK BOTANICAL GARDEN
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GLADIOLUS THRIPS

No pest is stronger than its own pet weakness—and a taste for sweets seems to be the weakness of the gladiolus thrips. This wee insect has proved a canny customer. Hiding in the chinks between the leaves for the greater part of its short life, it survives the sprays usually applied to the sucking insects.

Experiments conducted by Dr. B. O. Dodge, Plant Pathologist of The New York Botanical Garden, in coöperation with the writer, proved that nicotine, pyrethrum, derris powder, naphthaline—many kinds of contact insecticides will kill thrips *if* the insects are hit by the spray. But—and here is the catch in it—thrips hide in the spaces between the overlapping leaves during the day, and many of them escape the poison spray. Repeated spraying weekly from the middle of June until the last of August, with preparations of whale-oil soap and nicotine, held the thrips in check so that the gladiolus borders developed undamaged flowers during that season. But many thrips survived even this repeated dosing, and when the spraying was discontinued toward the end of the season, the thrips promptly increased up to a full quota of all ages in the short space of ten days. Such continuous spraying, while effective, is scarcely practical for the average gardener.

Many commercial and professional growers report complete immunity from injury by thrips where they use overhead sprinklers on their beds all night long. Whether the thrips are destroyed by the force, the amount, or the temperature of the water still remains a question. Judging, however, by the poor results from syringing where thrips have attacked gladiolus plantings in the greenhouse, these factors may all be important. Most of the

successful water treatment has been with rather cold water. Perhaps its beneficial effect in discouraging thrips has been more in chilling them than drowning them. In any case, it is apparently not always a dependable cure.

Several gladiolus growers and enthusiasts still follow only the early recommendations for the control of thrips on the dormant corms, on the assumption that the principal cause of thrips injury is their introduction on the corms. This undoubtedly accounts for the rapid spread of the pest throughout the country, for thrips do winter over as adults, and possibly also as eggs on the corms. But this is evidently not the only source of infection. Corms that were carefully freed from all thrips before planting last season, by dipping in nicotine solution before storage, and again in mercuric chloride solution after peeling all of the husks off in the spring just before planting, had thrips move on them from neighboring volunteer gladiolus plants as soon as the new sprouts were well above ground. Obviously, since thrips survive our winters here outdoors, any treatment of the corms before planting can be effective only on new ground where no gladiolus thrips have previously resided.

Treatment of the soil with naphthaline flakes or with nicotine dust has also been proposed and tried. Some reports of very encouraging results have been received, especially where a layer of the insecticide is spread over the soil directly above the bulbs at planting, so that the new sprouts must come up through it. This sounds like a good treatment, if the amount of the poison is carefully gauged so as not to injure the plants.

But despite all precautions, many people will find thrips chewing out gray patches on the foliage of their growing plants this summer.

The number of little black adults working on the leaves may seem few and appear negligible. But we must keep in mind the fact that this pest is primarily a flower thrips. It develops most abundantly in the spathes of the flower buds, and the black adults found on the young plants are simply marking time until the flower buds emerge. Then they will lay hundreds of tiny eggs inside of the flower spathes, where the orange-yellow wingless larvae will hatch out about three days later, and grow into black, winged adults in about a week or ten days' time, to be ready in

turn to start another family numbering hundreds from each mother thrips. The adult thrips are short-lived in warm weather (though they may survive the entire winter in a semi-dormant state in a cool storage cellar) and usually complete their life activities and die after a week or two of adult life. So there are several broods of thrips during the summer, and their capacity for rapid multiplication is amazing.

The immature orange-yellow larvae spend their lives hidden away inside the plant, tucked between the leaves or leaf-sheaths of the flowers. If affected flower-heads and all old withered stalks are promptly cut off and burned, very many of the thrips larvae will be destroyed. But the real point of attack is to capture and kill the adult thrips before they lay their eggs inside the coverings of the flower-buds, where they ruin the flowers by defacing or destroying the delicate petals before they emerge from the bud.

The best means of killing off the adult thrips is by appealing to their craving for sweets. Ordinary poison sprays, such as arsenate of lead, seem to be ineffective against the gladiolus thrips. Either, like the house ant, the thrips has a discriminating taste, or with its scraping and sucking mouth parts, it fails to get a killing dose. But the thrips apparently has a weakness for sweets. A spray of dilute molasses or brown sugar solution with Paris green was reported in Canada as effective last season. This syrup spray was tried in the greenhouse at The New York Botanical Garden this winter with very satisfactory results. A half pint of black molasses and a teaspoonful of Paris green were mixed in a gallon of water and sprayed on several potted plants that were abundantly infested with adult thrips just as they were reaching flowering size. A week later only one adult thrips and two larvae were found hidden between the leaf bases. The spray was repeated, and at that time one flower-stalk was well formed. Usually thrips congregate on the tender young flower-stalks and lay their eggs there. The young larvae then ruin the flowers. A week after the second spraying, the flower-stalk, the first bud of which was showing color, had only two thrips larvae in it—not enough to cause appreciable damage. Subsequently, during the blossoming, a few more thrips larvae were found in the flower

buds, but there were never enough to mar the flowers, and no more adults were found.

Apparently, this sweet spray disposes of the adult thrips, which must come out and move about to lay their eggs in the young tissues. Two sprayings of the molasses preparation a week apart effectively controlled the infestation in the greenhouse. If applied earlier, it probably would have entirely prevented any thrips from laying eggs in the flower buds, since it so effectively disposed of the adult insects. The gladiolus thrips, so cannily resistant to forcible methods of extermination by evil-smelling, irritating, or distasteful preparations, seems to fall an easy victim to the attractions of a sweet-tasting poison.

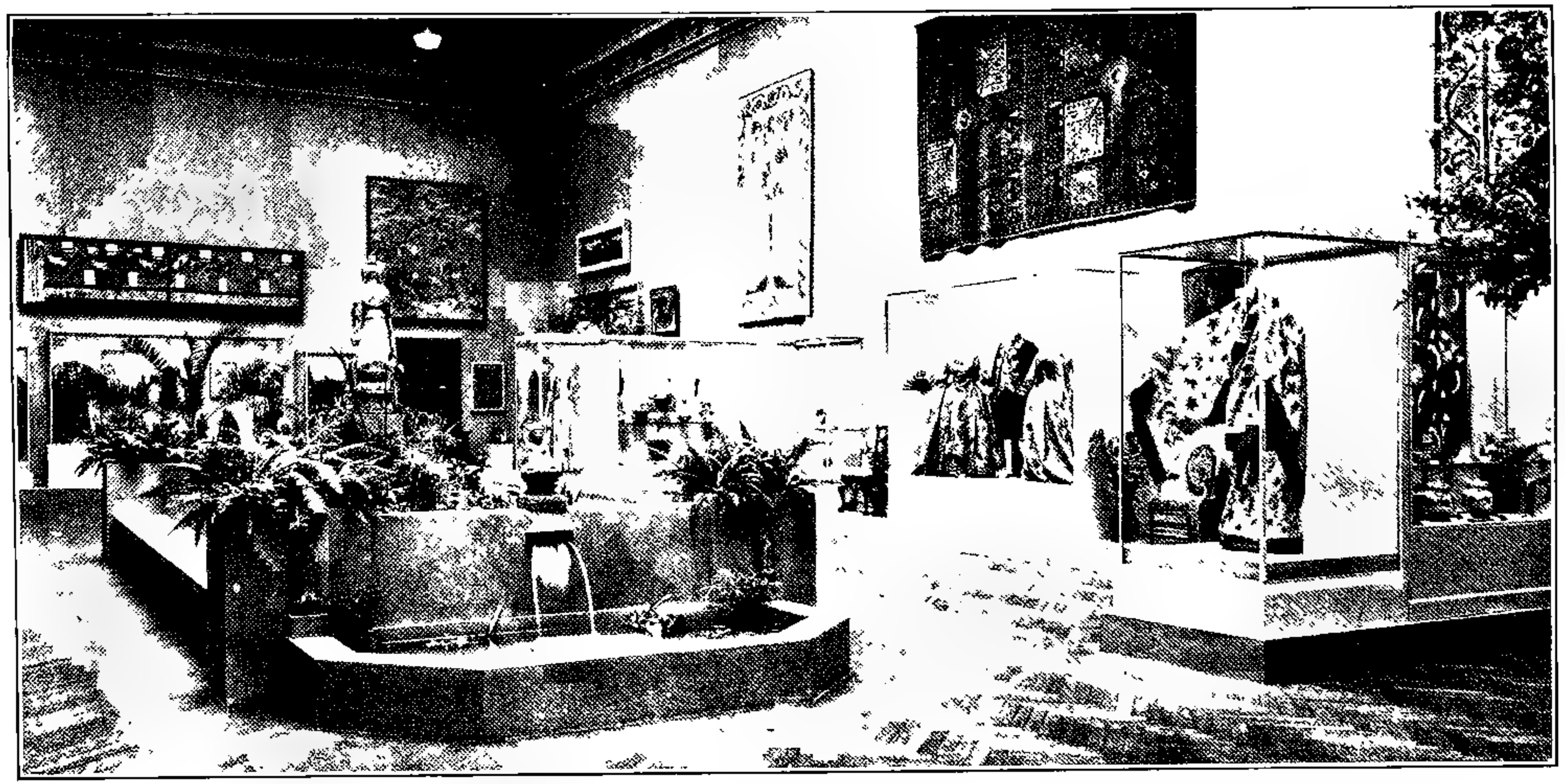
FORMAN T. MCLEAN.

* * * *

JOHN H. FINLEY, FOREMAN GARDENER

John H. Finley, a Foreman Gardener, who had been in the employ of The New York Botanical Garden almost ever since the first work in development and planting in Bronx Park, a period of more than 34 years, died on June 11th, 1933. He had been in charge of most of the out-of-door plantations, the lawns, paths and stable, directing forces of gardeners and of laborers, under the supervision of the Head Gardener and of the Superintendent of Buildings and Grounds. He was diligent in his duties, efficient in method, faithful in a high degree, esteemed and beloved by superiors and subordinates. The Garden has lost a very valuable officer, and his associates a very dear friend. He was in his sixty-fourth year.

N. L. BRITTON.



VIEW OF PART OF THE EXHIBIT OF PLANT FORMS IN ORNAMENT

FIGURE 1. Living plants, to complement the display of wearing apparel and accessories, of hangings, pottery, architecture, and sculpture, in which plant life has formed the motive of the design, are being furnished by The New York Botanical Garden and The Brooklyn Botanic Garden. Materials for the exhibit, which will continue at The Metropolitan Museum of Art until September, have been gathered from all ages of culture, the world around. Photograph by courtesy of The Metropolitan Museum of Art.

A MAGNOLIA AS A NEW BORDER PLANT

"Exotic" is the descriptive response to the sight of *Magnolia Ashei* in bloom. A single flower in its setting of unusual leaves is comparable to the single object of art which dominates the character of a whole room.

To plead for a tree magnolia to be used as a border or bedding plant might seem to be advocating the impossible. However, several years ago a new magnolia was discovered in western Florida. It was first found in Okaloosa County. The original specimens were described as shrubby plants or trees up to nearly eight meters tall, with very large white flowers. It was found to be related to the Great leaf Magnolia (*Magnolia macrophylla*) which is distributed from western Florida to Louisiana, Arkansas, Kentucky, and North Carolina.

Specimens were submitted by the late Mr. W. W. Ashe to Mr. C. A. Weatherby, who named and described it as *Magnolia Ashei.*[1]

After the publication appeared we received information[2] to the effect that a large-leaved magnolia growing in the Knox Hill country of western Florida might be the newly launched species.

During a trip of exploration in Florida subsequent to the receipt of this information we visited the Knox Hill country. This region is small in area, but it is populated by an interesting plant assemblage. The plant in question was readily located, with flowers and a few old fruits, the technical characters of which definitely associated this magnolia with *M. Ashei.* The accompanying photograph was secured at that time. Although the original specimens were in tree form, the plants in the Knox Hill country, so far as we saw them, were shrubby in habit, as the photograph shows.

Several specimens were sent to the Garden, where they have grown and have proved to be hardy in this northern latitude. They have retained their shrub-habit, flowering when only about a foot tall. The height of the plants in the photograph may be estimated by the size of the two and a half foot machete standing in the foreground. This handy implement will also serve as a gauge to estimate the size of the leaves and the flowers.

[1] Rhodora **28**: 35. 1926.
[2] Letter from Dr. R. M. Harper.

FIGURE 1. Several shrubs of *Magnolia Ashei* in the Knox Hill country, Florida, with three open flowers and two buds. Small plants brought to the Garden have attained a height of a foot and have flowered for several years.

As the plant has proved itself hardy in this latitude, blooming usually in May, a bed or a border of it should prove an original and interesting planting.

JOHN K. SMALL.

STATE FLOWERS

The Literary Digest covers for February 4 and 11, 1933, carry an interesting series of color reproductions of state flowers, the 39 illustrated representing the official flowers of 47 states and the Territory of Alaska. Pennsylvania is omitted as being the only commonwealth that has no official state flower, but since then (May 5) Governor Pinchot has signed a bill designating the mountain laurel as the state flower of Pennsylvania.

Those who guided the selections of these flowers apparently did not always take into consideration the place of geographic origin of the plants, for a considerable number are not even native plants but are introduced, many from Europe and Asia. In 36 cases native species happened to be selected, but 12 states have chosen exotics which for the most part are not native of any part of North America.

The cultivated apple, for instance, is a native of central Asia, introduced into the United States from Europe by the early colonists. There are, however, some wild apples native in northern and mid-western United States; possibly it was these that the residents of Arkansas and Michigan had in mind in selecting their floral emblem.

The peach, representing Delaware, is a cultivated tree brought to America from Europe, where it had been introduced from its original home in Asia.

The purple lilac, which New Hampshire has chosen, is also an exotic, though long cultivated here, all the lilacs being natives of Europe and Asia. *Zinnia,* representing Indiana, is a native of Mexico, and occurs in the northern United States only as a cultivated ornamental plant. The scarlet carnation designated by Ohio as its official state flower also occurs with us only as a cultivated plant; it is strictly of garden origin and was derived from European parents. The double-flowered rose which New

York[1] has chosen as its representative flower is also a garden form derived from European and Asiatic species.

Even the red clover, representing Vermont, came from Europe, while the ox-eye daisy of North Carolina is a weed, also of European origin. The black-eyed Susan proclaimed as a favorite in Maryland is a similar weed introduced from our own middle west, where it is native; it is not native in Maryland.

The orange, representing Florida, is an exotic plant, as are all its relatives—the lime, lemon, citron, and pomelo; it was introduced into the United States from the Mediterranean region, but is a native of tropical Asia.

The Cherokee rose representing Georgia is perhaps the most interesting case. It was first described in 1803 from specimens collected in Georgia by Michaux, and was even at that early date apparently thought to be a native species. It is, however, a native of China, introduced and naturalized in our southern states in the 18th century.

The list on *The Literary Digest* cover for February 4 is as follows:

1. Apple blossom (*Malus*), Arkansas and Michigan. The cultivated apple was introduced from Europe; there are however, a few native species of the same genus in the northern United States.
2. Hawthorn (*Crataegus*), Missouri, native.
3. Indian paint-brush (*Castilleja*), Wyoming, native.
4. Sego lily (*Calochortus*), Utah, native.
5. Syringa (*Philadelphus*), Idaho, native.[2]
6. Bitter-root (*Lewisia*), Montana, native.
7. Magnolia (*Magnolia*), Louisiana and Mississippi, native.
8. Zinnia (*Zinnia*), Indiana.[3] Introduced from Mexico.

[1] The selection of "the rose" in New York was by vote of the school children in 1891. There was apparently no indication as to whether the rose intended was native or foreign, single- or double-flowered, but it may be fair to assume that the cultivated double-flowered roses were in the minds of most of the voters; the double-flowered rose is the one illustrated by the Literary Digest.—Ed.

[2] It is assumed that one of the native Idaho species was intended. The cultivated species of this genus are of European and Asiatic origin.

[3] *Zinnia* was designated by the legislature of Indiana in 1931. Formerly the flower of the tulip-tree was the state flower of Indiana. The tulip-tree is now the state tree.

9. Purple lilac (*Syringa*), New Hampshire. Introduced from Europe.
10. American dogwood (*Cornus*), Virginia, native.
11. Wild rose (*Rosa*), Iowa and North Dakota, native.
12. Pine cone and tassel (*Pinus*), Maine, native.
13. Red clover (*Trifolium*), Vermont. Introduced from Europe.
14. Bluebonnet (*Lupinus*), Texas, native.
15. Golden poppy (*Eschscholtzia*), California, native.
16. Yellow jessamine (*Gelsemium*), South Carolina, native.
17. Moccasin flower (*Cypripedium*), Minnesota, native.
18. Mayflower (*Epigaea*), Massachusetts, native.

The list on *The Literary Digest* cover for February 11 is as follows:

1. Ox-eye daisy (*Chrysanthemum*), North Carolina.[4] Introduced from Europe.
2. Peach blossom (*Prunus*), Delaware. Introduced from Europe.
3. Mountain laurel (*Kalmia*), Connecticut, native.
4. Passion flower (*Passiflora*), Tennessee, native.
5. Violet (*Viola*), Illinois, New Jersey, Rhode Island, and Wisconsin, native.
6. Black-eyed Susan (*Rudbeckia*), Maryland, native of the middle west; introduced in Maryland.
7. Orange blossom (*Citrus*), Florida. Introduced from Asia.
8. Goldenrod (*Solidago*), Alabama, Kentucky,[5] and Nebraska, native.
9. Sunflower (*Helianthus*), Kansas, native.
10. Columbine (*Aquilegia*), Colorado, native.
11. Yucca (*Yucca*), New Mexico, native.
12. Scarlet carnation (*Dianthus*), Ohio. Introduced from Europe.
13. Cherokee rose (*Rosa*), Georgia. Introduced from China.
14. Forget-me-not (*Myosotis*), Alaska, native.
15. Rose (*Rosa*), New York,[6] Introduced from Europe.
16. Sagebrush (*Artemisia*), Nevada, native.
17. Pasqueflower (*Anemone*), South Dakota, native.
18. Mistletoe (*Viscum*), Oklahoma, native.

[4] In *Nature Magazine* for April, 1932, and in *The World Almanac,* the goldenrod is said to be the state flower of North Carolina. Mr. A. R. Newsome, secretary of The North Carolina Historical Commission, informs us that "The legislature of North Carolina has never officially designated a state flower."

[5] The naming of the trumpet-vine as the state flower of Kentucky in *Nature Magazine* for April, 1932, is apparently an error.

[6] See footnote on page 153.

19. Rhododendron (*Rhododendron*), West Virginia, Washington, native.
20. Oregon grape (*Mahonia*), Oregon, native.
21. Saguaro (*Carnegiea*), Arizona, native.

Missouri, Wyoming, Utah, Idaho, Montana, Louisiana, Mississippi, Virginia, Iowa, North Dakota, Maine, Texas, California, South Carolina, Minnesota, Massachusetts, Connecticut, Tennessee, Illinois, New Jersey, Rhode Island, Wisconsin, Alabama, Kentucky, Nebraska, Kansas, Colorado, New Mexico, Alaska, Nevada, South Dakota, Oklahoma, West Virginia, Washington, Oregon, and Arizona are represented by indubitable native species.

Arkansas, Michigan, Indiana, New Hampshire, Vermont, North Carolina, Delaware, Maryland, Florida, Ohio, Georgia, and New York are represented by exotics as far as these commonwealths are concerned. One of these (Indiana) is represented by a Mexican species, another (Maryland) is represented by a species native of our own Middle West, but all the other states in this list are represented by species native of Eurasia, introduced and either naturalized or cultivated in the states they represent.

E. D. MERRILL.

ASIATIC IMMIGRANTS IN THE BOTANICAL GARDEN III

Among the full dozen immigrant shrubs in the area of The New York Botanical Garden, only three are vines—*Celastrus articulatus, Nintooa japonica,* and *Ampelopsis brevipedunculata,* which is the vine described below. The last named, called Japanese woodbine, in addition to being a vine, is set off from the others by being tendril-bearing. The other two vines are twiners.

Related species of *Ampelopsis* are well known in North America—the pepper-vine (*Ampelopsis arborea*) and its relative, *A. cordata,* both very vigorous woody climbers. This case is an example of a phase of geographic distribution where the American relatives of certain Asiatic plants are confined to eastern North America.

The privet (*Ligustrum*), however, which is also treated here, has no native specific relatives in the Western Hemisphere. Its

closest relatives are the American olive (*Osmanthus*), the fringe-tree (*Chionanthus*), and the little olive (*Foresteria*). The ash (*Fraxinus*) is a more distant relative.

In 1899 the Amur-River privet (*Ligustrum amurense*) was introduced into the Botanical Garden from plants received from the Buffalo Botanic Garden. The plants thrived in the Fruticetum and soon flowered, and bore fruit. The bluish drupes are of a size suitable for food for both small and large birds. They are rather persistent that is, those that have not been picked off by the birds early in the season—and remain on the shrubs well into the winter. Thus they furnish a supply of food for such birds as tarry or those that spend the winter in this latitude. It soon became evident that the birds were not slow in acting as agents of naturalization, for plants of the privet soon began to appear in and about the woods, especially near the Bronx River. This privet was discovered about the middle of the past century and named in 1861. It was introduced into horticulture much later than the more commonly grown so-called California privet (*Ligustrum ovatum*), also a native of Asia, from which it differs in its pubescent twigs and inflorescence branches and in the pedicelled flowers and fruits. Also the leaves are less persistent in the autumn.

In 1899 the Japanese woodbine (*Ampelopsis brevipedunculata*) was introduced into the Botanical Garden from Moon's Nurseries. It was originally planted in the Viticetum east of the Museum Building and, later, plants were set out along walls in the Garden. This vigorous grower often bears an abundance of fruits. The berries show several colors before they assume the final brilliant greenish-blue. Consequently different birds which may be attracted by different colors have a selection. The vine was not slow in appearing spontaneously in various locations in the Garden, especially in woods and in thickets along the Bronx River.

There are several horticultural varieties based on the leaves, whose blades may vary from being merely toothed to much lobed. There is also a variety with variegated leaf-blades.

JOHN K. SMALL.

DR. BRITTON RECEIVES SILVER MEDAL

Dr. N. L. Britton, Director Emeritus of the Garden, is the recipient of a silver medal presented by the American Scenic and Historic Preservation Society, in recognition of his founding of The New York Botanical Garden. The presentation was made

FIGURE 1. The medal received from The American Scenic and Historic Preservation Society by Dr. N. L. Britton, in recognition of his more than half a century of scientific work and his founding of The New York Botanical Garden.

during the thirteenth national conference on state parks at Bear Mountain Park, May 23–27. Two other silver medals, as well as four of gold and three of bronze, were awarded at the same time.

In making the presentation, Vice-President LeRoy E. Kimball said:

"Dr. Nathaniel Lord Britton—for over fifty years a serious scholar of enviable rank in the fields of geology and botany; author of many alluring books and monographs in your favorite field of botany; founder of The New York Botanical Garden, and for thirty-three years its Director-in Chief: we extend to you our deepest appreciation for your accomplishments in that most educational and scenic garden which has been so much a part of your life, in token of which appreciation we ask you to accept this medal."

TWO NOTEWORTHY COMPILATIONS

List of Plants at the Atkins Institution[1]

Mr. Edward F. Atkins established this Cuban botanical garden in 1900. Its collection of growing plants has gradually increased, both under his ownership and more recently under the direction of the Arnold Arboretum, until it now includes approximately 1970 species. All of these are now listed alphabetically in the book before us, including not only the accepted scientific name but also the chief synonyms and a large number of English and Spanish vernacular names. The list shows that most of the important economic plants of the tropics are here in cultivation. Among rubber-producing plants, for example, we notice species of *Landolphia, Hevea, Manihot, Sapium, Castilloa, Ficus,* and *Mimusops.* Of special interest among the fruits are the Malayan durian and mangosteen. The Leguminosae are best represented, with 210 species, and there are 110 species of palms.

Vegetation of the Swiss Jura[2]

The praiseworthy activity of the Swiss geobotanists has long been known and these scientists are to be complimented as well

[1] Grey, Robert M., and Hubbard, F. Tracy. List of plants growing in the botanical garden of the Atkins Institution of the Arnold Arboretum at Soledad, Cienfuegos, Cuba. Pp. vi + 245. The Harvard University Press, Cambridge. 1933.

[2] Spinner, Henri. Le Haut-Jura neuchâtelois nord-occidental. Matériaux pour le levé géobotanique de la Suisse, Fasc. 17. 197 pages, 6 plates, 2 maps in color, and numerous text-figures. Hans Huber, Berne, 1932. Fr. 12.

on having such adequate means of publishing their results as are offered in this Swiss botanical review. This little area on the French frontier in western Switzerland, with a population of 772 species of flowering plants, covers an area of only 50 square miles. Altitudes range from 3000 to 4500 feet and most of the land is covered with forest, pasture, or meadow. The various plant associations are described with a wealth of detail and are excellently illustrated by half-tone figures. Their distribution is shown in twelve colors on a large map, with a scale of 1 to 25,000.

H. A. GLEASON.

GILIA RUBRA

Gilia rubra is not at all common in cultivation, although it ranks among the finest of half-hardy biennials and is invaluable for embellishing the conservatory during the month of June. In gardens it usually passes under the name *Gilia coronopifolia,* and as such may be sought in seed catalogues.

This species is a native of the southeastern United States, where it is found occupying sandy soils. It attains a height of six or seven feet and forms a stout erect stem, branched above and densely clothed with finely divided pinnate leaves, which are more or less furnished with gray pubescence. The flowers are produced in profusion, both on the central axis and on the laterals. They are long trumpet-shaped with spreading lobes; in the type, bright orange-scarlet except for the inside of the corolla, which is paler in ground color but profusely speckled with markings of the deeper hue. A variety occurs with nankeen-yellow flowers, speckled within with red, and seed offered as *Gilia coronopifolia* hybrids produces plants having flowers varying from this yellow hue through several shades of pink to the typical bright scarlet.

To obtain the best results, seed must be sown in the greenhouse toward the end of June, and the resulting seedlings should be transplanted to flats as soon as they are large enough to handle. From the flats the young plants should later be transferred to three-inch pots, using a light but rich soil, and to pots an inch larger when these receptacles are well filled with roots.

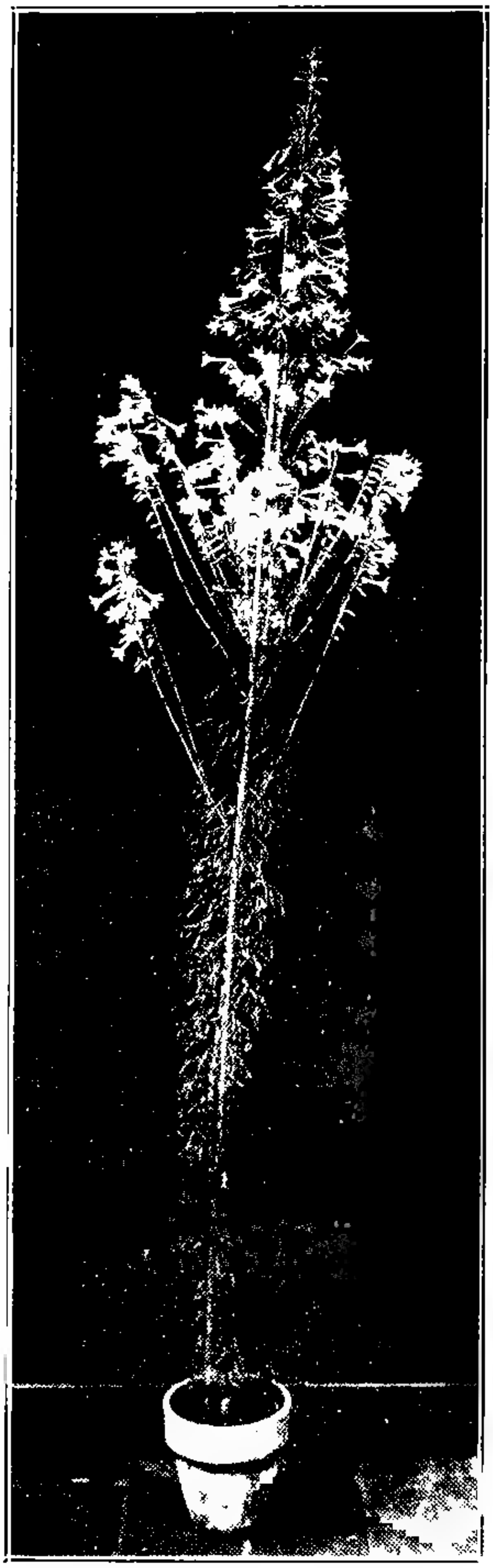


FIGURE 1. *Gilia rubra*, a seven-foot plant from southeastern United States.

In the four-inch pots the plants may remain during the winter, and as they are almost dormant at this season great care must be taken in the matter of watering, for an excessive supply at the roots will surely be followed by loss. It is also of particular importance that no moisture be permitted to gather in the dense rosette of fine foliage which forms the crown of the plant. Cool growing conditions, with ample ventilation and full exposure to sunlight, are essential at all times.

As soon as signs of activity become apparent in the spring, the plants should be repotted, using a rich soil of sandy character and pots six inches in diameter. In these pots the plants will bloom, and when the soil is permeated with roots systematic feeding with dilute manure water and with soot-water, varied occasionally with an approved fertilizer, will aid thrifty growth. Staking is necessary and thin bamboos form the neatest type of support. Smaller specimens may be obtained by sowing in September and allowing the plants to flower in four-inch pots.

T. H. EVERETT.

THE GRAVE OF STEPHEN ELLIOTT

Stephen Elliott, in his day, was one of the most honored and distinguished citizens of South Carolina. Graduate of Yale (1791); member of the legislature; state senator; founder of the first public school system of the state; founder of the state bank, and its first president; original member and first president of the Literary and Philosophical Society of South Carolina; professor in the Medical College of Charleston; yet throughout his active career a painstaking student of the flora of his native state.

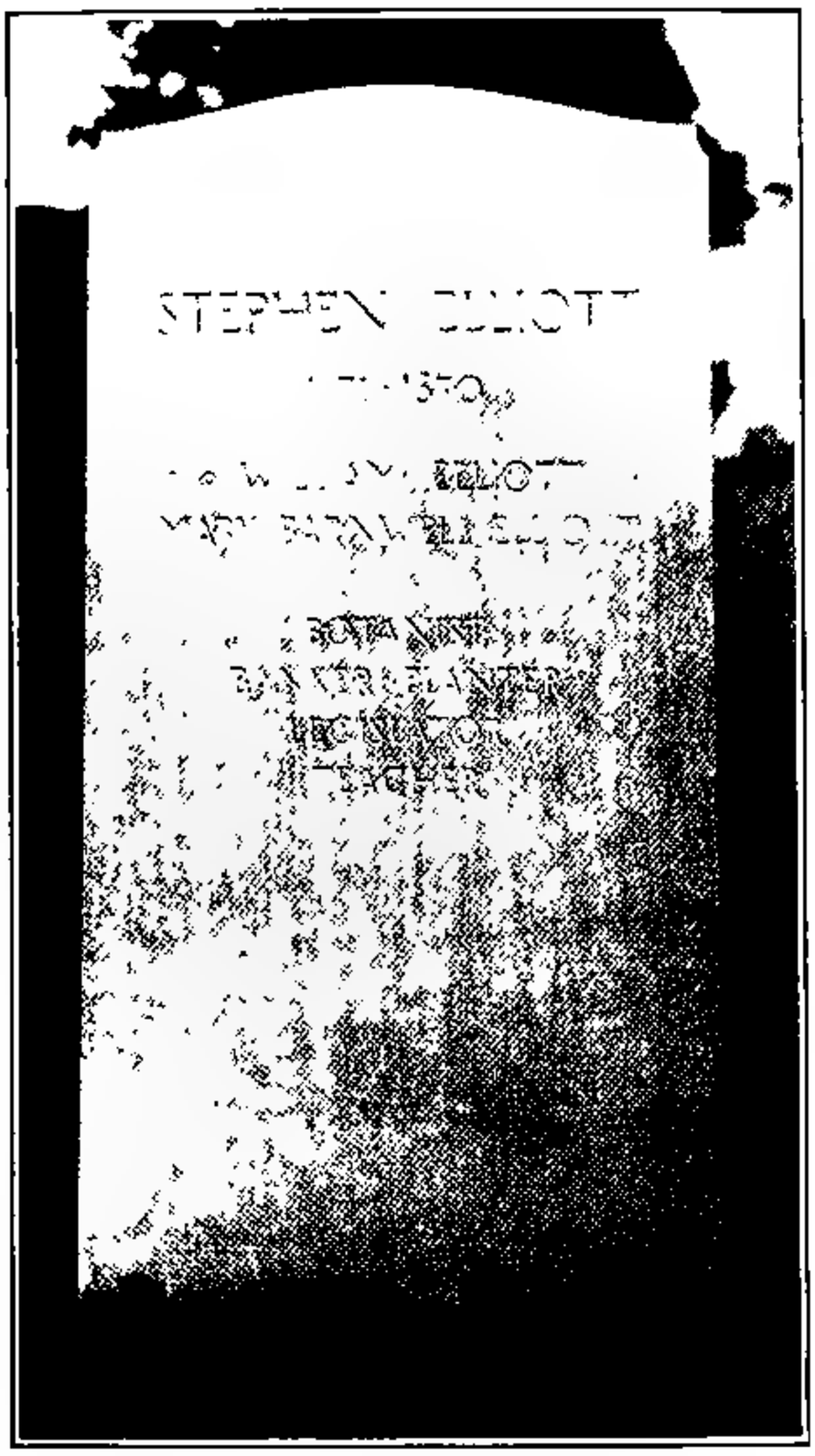


FIGURE 1. The marker recently placed on Stephen Elliott's grave.

The results of his botanical studies were recorded in a 2-volume, 1300-page book, modestly entitled "A sketch of the botany of South Carolina and Georgia." This work abounds in original observations, and is illustrated by twelve plates engraved from his own drawings. It is one of the classics of American botany.

Until 1812 he was a planter at Beaufort, his native place, and thereafter lived at Charleston until his death in 1830. Then he was interred with impressive ceremony in St. Paul's churchyard, but the grave was unmarked for more than a century; for many years its very location was forgotten. Finally, on Sunday, February 26, 1933, a simple monument erected at the expense of the family was unveiled with appropriate ceremonies, and now the grave of this distinguished scientist is fittingly marked.

The inscription on the stone records him as "botanist, banker, planter, legislator, teacher." Not without reason is "botanist"

placed first in the list; as a botanist he needs no other memorial than the cherished copies of his "Sketch" in the libraries of the world, and it is probably as a botanist that his fame is most secure.

The accompanying illustration of the memorial tablet now marking Elliott's last resting place is from a photograph kindly supplied by Clara Childs Puckette, wife of Stephen Elliott Puckette, a great-grandson of Stephen Elliott, the botanist. Mrs. Puckette has been one of those most interested in securing the memorial and supplying the press with information concerning the famous citizen commemorated by it.

JOHN HENDLEY BARNHART.

A GLANCE AT CURRENT LITERATURE[1]

Among the new books recently added to the library at the Botanical Garden is "Die Gartenstauden" (Garden Perennials), by H. R. Wehrhahn, designated as a work "for gardeners, perennial-growers, and garden friends." Its two volumes, comprising more than 1200 pages of scientifically classified cultivated plants, are illustrated with 612 photographs of flowers in their garden surroundings.

From the same publisher, Paul Parey, comes a volume on carnations by Otto Sander; also "Handbuch der Nadelholzkunde" (Handbook of Conifers), which is a revised and enlarged edition of Beissner's standard work, by J. Fitschen, a well-illustrated volume of 765 pages; and "Krankheiten und Schädlinge der Zierpflanzen" (Diseases and Injuries of Decorative Plants) by Heinrich Pape.

* * * *

The need for increased knowledge of the distribution and control of plant diseases is expressed by Neil E. Stevens of the United States Bureau of Plant Industry in *Phytopathology* for April.

* * * *

Iris chrysophoenicia, a velvety plum-colored species which is said to be easy to raise, is treated by E. J. Alexander and Mrs. E. A. S. Peckham in *The National Horticultural Magazine* for April.

[1] All publications mentioned here—and many others—may be found in the Library of The New York Botanical Garden, in the Museum Building.

Interesting photographs of rock gardens and of roses, two articles on nut culture, and six plans for front-yard treatment are included in this number.

* * * *

The identification of two daylilies, *Hemerocallis aurantiaca* and its variety *major*, is discussed by Dr. A. B. Stout in *The New Flora and Silva* for April. Among other interesting features of the issue are "The Newer Heaths" by A. T. Johnson and descriptions and photographs of the native *Ceanothus* of California, with suggestions for culture, by Lester Rowntree.

* * * *

Preferred varieties of peonies of different types and colors are described in their relation to the ensemble of the garden by Franklin B. Mead in the March *Bulletin* of the American Peony Society.

* * * *

Dr. N. L. Britton writes on " An Unrecognized Species of Cactus " in the April *Cactus and Succulent Journal.*

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

Dr. R. R. Stewart will be sailing for India in August, after completing last month a year's study of the northwestern Himalayan flora at The New York Botanical Garden. Upon his arrival in India, he says, he will be glad to communicate with anyone desiring specimens of plants from the region in which he is interested.

With his family, he is returning to his post as vice-principal and head of the department of biology at Gordon College, Rawal Pindi, Punjab, where he has been stationed since receiving his A. B. degree from Columbia University in 1911. His Ph. D. was taken there in 1916.

Dr. Stewart has also had charge of the leper asylum in Rawal Pindi, from which 30 patients were able to be discharged last year, symptom-free, after treatment with chaulmoogra derivatives. The institution takes care of 130 victims.

A collection of new hybrid daylilies in named varieties, created at The New York Botanical Garden by Dr. A. B. Stout, won first prize as "the most interesting exhibit" at the flower show in Stockbridge, Mass., the last of June. The collection was suggested and arranged by Mrs. Carl A. de Gersdorff, a member of the Advisory Council of the Garden.

Dr. H. A. Gleason and Edmund H. Fulling left New York in June to attend a two-months' summer session at the Biological Station of the University of Michigan. While Mr. Fulling, who will be accompanied by Mrs. Fulling, will continue his researches in plant anatomy and morphology, Dr. Gleason plans to do some collecting. The station is located on Douglas Lake in northern Michigan, about 20 miles south of Mackinaw City.

Among the visitors who registered in the library during the spring were the following botanists: Dr. Alice M. Ottley and Dr. Grace E. Howard, Wellesley, Mass.; Mrs. C. T. Brues, Cambridge, Mass.; Mr. William H. Judd, Jamaica Plain, Mass.; Prof. A. W. Evans, Dr. Glen Gardner Hahn, and Mr. Theodore T. Ayers, New Haven, Conn.; Dr. Francis W. Pennell and Dr. Edgar T. Wherry, Philadelphia, Pa.; Dr. A. S. Hitchcock, Dr. E. P. Killip, Mr. P. L. Ricker, Mr. F. C. Meier, and Mr. Knowles A. Ryerson, Washington, D. C.; Dr. William B. Kemp, College Park, Md.; Dr. F. W. Foxworthy, Miami, Fla.; Dr. Ludwig Diels, Berlin, Germany; and Mr. Ivar Elvers, Stockholm, Sweden.

Meteorology for May. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 75° F. on the 7th; 78° on the 14th; 90° on the 20th and *95° on the 27th.* The minimum temperatures recorded were: *43° on the 5th;* 44° on the 11th and the 17th; and 53° on the 23rd. The total precipitation for the month was 3.92 inches.

Meteorology for June. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 87° on the 3rd; *103° on the 9th;* and 96° on the 12th and 22nd. The minimum temperatures recorded were: 48° on the 2nd; 64° on the 11th; *46° on the 15th;* and 47° on the 21st. The total precipitation for the month was 2.63 inches.

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Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than 1,500,000 specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 42,800 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestral subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

Contributions to the Garden may be deducted from taxable incomes.

The following is an approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ———.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be sent to

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JOURNAL
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BROMELIADS AND PINE TREES
JOHN K. SMALL

THE DUTCH ELM-DISEASE IN A NEIGHBORING STATE
B. O. DODGE

BIRD COURSE TO BE REPEATED

BILLION DOLLAR BERRIES
F. C. MEIER

WILD FLOWERS OF THE ALLEGHANIES
FORMAN T. MCLEAN

CELSIA CRETICA
T. H. EVERETT

A GLANCE AT CURRENT LITERATURE
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BROMELIADS AND PINE TREES

Late last year the writer received a message from Mr. George P. Ludlam, of the National Broadcasting Company, seeking information about Spanish-moss[1] (*Dendropogon*) growing on pine trees. A letter of protest from a correspondent in Alabama was received after a broadcast in which occurred the phrase, "bearded with Spanish-moss—great southern pines rock gently in the warm air." The correspondent stated (1) that Spanish-moss does not grow on pine trees and (2) that it does not grow in Alabama.

In reply to Mr. Ludlam the writer gave the geographic distribution of the Spanish-moss, and also its arboreal distribution and some of the factors governing it.

The information given out by the National Broadcasting Company was correct. It seems strange that it should have been questioned by one who lives in a state that lies largely within the Spanish-moss belt. However, the instance brought to mind some of our observations in the Gulf States.

Strange to say, there is a wide-spread belief that epiphytic bromeliads occur only on broad-leaved trees in the Gulf States. Long-moss (*Dendropogon*), ball-moss (*Diaphoranthema*), wild-pines (*Tillandsia*) really occur on nine different species of

[1] This outstanding plant is common in the American tropics. It is also known botanically as *Tillandsia usneoides*. It has many uses and also many popular names. In addition to Spanish-moss, some of these are, Florida-moss, long-moss, American-moss, black-moss, New Orleans-moss, southern-moss, old-man's beard, tree-beard, vegetable-wool, crape-moss, and wool-crape. The plant is not technically a moss, but a bromeliad of the pineapple family.

FIGURE 1. Trees of the long-leaf pine (*Pinus australis*) in central Florida, laden with Spanish-moss. At the right is a live-oak tree (*Quercus virginiana*) with a copious growth of Spanish-moss.

conifers—on five pines (*Pinus*), two cypresses (*Taxodium*), one white cedar (*Chamaecyparis*), and one red cedar (*Sabina*). Only a few kinds grow on the two last-named trees, but the cypress is host to at least ten species of bromeliads.

Anyone who has traveled through the flatwoods[2] of peninsular Florida should not be ignorant of the occurrence of long-moss on pine trees. The old trails and new highways that traverse this plant region are lined for mile after mile with the dominant pine tree often copiously draped with long-moss. In regions where moisture fills the air and where air currents are least active, especially in the vicinity of large tracts of low hammock growth, the growth of the long-moss on pine trees is most abundant.

Moreover, pine trees are not hosts to the long-moss alone. Other kinds of bromeliads, wild-pines (*Tillandsia*), take refuge on the trunks and branches of pine trees, both living and dead. Evidence to this effect is offered in Figures 2 and 3.

The abundance of bromeliads on pine trees is not alone dependent on a humid atmosphere, but sometimes on the source of supply of seeds. During our early explorations in the then wilderness on the Everglade Keys of Dade County, Florida, the slash-pine trees (*Pinus caribaea*) about the high hammocks in what was then the Homestead region were frequently heavily laden with the streamers of long-moss and the plants of the various wild-pines derived from the continuous supply of seeds from the often prodigious growth of bromeliads in the hammocks. The seeds of these bromeliads have attachments for floating in the air after the manner of milkweeds and dandelions.

Two kinds of pine trees occur in the "scrub." The sand pine (*Pinus clausa*), which is the typical species for this plant association, and the long-leaf pine (*P. australis*), which replaces the sand pine when the growth of the latter is wiped out by fire. The sand pine is not friendly to epiphytes, but the long-leaf pine often is the host to several kinds of wild-pines. Still another pine (*Pinus palustris*), the swamp pine, a tree of low or wet habitats, frequently tolerates epiphytes or vice versa. This tree grows in swamps, and is frequent on the edges of prairies and also occurs

[2] Flatwoods are low, very level pinelands where the ground water is very near the surface or where water stands on the surface for a part of each year.

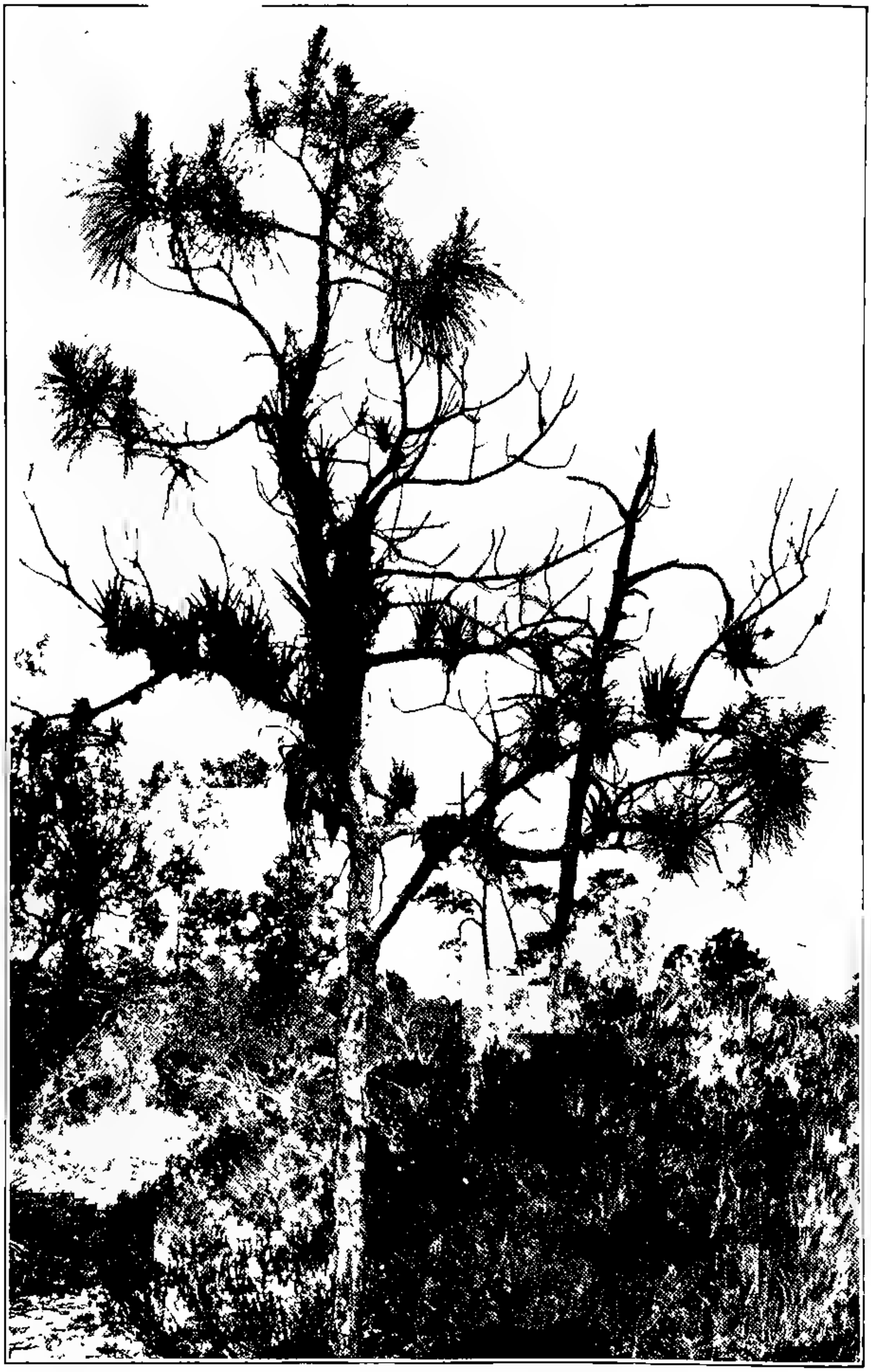

FIGURE 2. A small living long-leaf pine (*Pinus australis*) in the "scrub" near Lake Nancessowee, Florida, with a growth of two wild-pines (*Tillandsia fasciculata* and *T. utriculata*) on the lower branches.

FIGURE 3. On the edge of the Myakka Prairie, near the Sarasota-Charlotte county line, Florida, a dead tree of swamp pine (*Pinus palustris*) is shown with a growth of wild-pines (*Tillandsia fasciculata*) on the upper branches. Two black vultures are sitting on a right-hand branch. These bromeliads occupied this particular host for many years.

as islands in prairies. Its rough bark readily arrests the bromeliad seeds floating through the air from nearby hammocks and acts as host to several kinds of wild-pines, as well as to the long-moss.

The seeds of bromeliads are produced in countless myriads and are scattered far and wide by the wind. Trees are not their only hosts. The seeds of some kinds, especially the long-moss (*Dendropogon*) and the ball-moss (*Diaphoranthema*) sprout and thrive on electric wires, while the long-moss and several kinds of wild-pines (*Tillandsia*) frequently seek a chicken-wire fence as a host and grow there luxuriantly.

JOHN K. SMALL.

THE DUTCH ELM–DISEASE IN A NEIGHBORING STATE

A special dispatch to the *New York Herald-Tribune* of July 8 states that the fungous parasite that causes the Dutch elm-disease has recently been found at Maplewood, New Jersey. Six elm trees were proved to have been attacked by this fungus, one of them dying within two weeks after the symptoms of the disease were first discovered.

Several other trees in the vicinity are being watched closely. The infected trees were chopped down and the trunks, branches, twigs, and leaves were all thoroughly destroyed by burning. The first symptoms are a gradual yellowing of the foliage. Sometimes within a few days the leaves turn brown and then the branches begin to wither from the tips in toward the trunk, and by degrees the tree dies.

Dr. R. P. White, of the New Jersey Agricultural Experiment Station, and Dr. R. Kent Beattie, of the United States Department of Agriculture, and representatives of other organizations are coöperating in a survey to locate other infected trees with the view to destroy them before the disease can spread. Left to itself there is no doubt that this fungus would eventually destroy our elms much as the chestnut blight fungus has wiped out the American chestnut in eastern United States.

Millions of the bark beetle *Scolytus multistriatus* were found in one dead elm tree at Maplewood, New Jersey, and it is sus-

pected that this bark beetle may be the means of spreading the fungus parasite. Dr. White offers to examine any specimens of dead elm twigs sent him, and report on his findings regardless of where the trees may be located.

Send twigs suspected of being attacked by the Dutch elm-disease to him at the Agricultural Experiment Station, New Brunswick, New Jersey. The twigs should be about six inches long and the size of a lead pencil. Specimens may be sent also to The New York Botanical Garden for examination.

Three or four of our elms at the Botanical Garden have been infested by the elm-bark beetle. This insect does not usually infest trees until they have been weakened from some other cause. If the trees are kept in a vigorous condition, they are much less liable to attack. Any branches or wood showing the presence of the beetles should be cut out and burned.

The elm-leaf beetle has again been attacking elms in this vicinity. In Westchester County, for example, one sees not a few dead elm trees, probably killed by the leaf beetle last year. This beetle has done some damage to elms in the Bronx. None of our elms on the grounds of The New York Botanical Garden has been killed, although a few of them show some leaf injury. Spraying the trees thoroughly with arsenate of lead, using about three or four pounds to one hundred gallons of water, has been found a fairly good control if the application is made early enough.

Keeping elm trees free from insect pests may prove to be the first important step in combating the recently introduced fungus disease.

B. O. Dodge.

BIRD COURSE TO BE REPEATED

The field course on "Birds and their Food Habits" which was conducted at The New York Botanical Garden last year by Miss Helene M. Lunt will be repeated, beginning September 16. Board of Education credit will not be given this year, however. Registrants may write to Miss Lunt at her home address, 114 Nagle Avenue, New York, N. Y., to arrange for the opening meeting.

BILLION DOLLAR BERRIES[1]

Grain valued at more than $750,000,000 has been lost since 1916 in the United States because of the ravages of the disease known as black stem-rust. During the last few centuries rust losses throughout the world have mounted to billions of dollars. The fascinating story of the relationship of this disease to world agricultural development is inextricably bound up with the history of the common barberry. The enormous cost of this plant in terms of rust losses to the grain farmers of the world can hardly be estimated.

The popularity of the common barberry bush (*Berberis vulgaris* L.) as a medicinal and otherwise useful plant led to its being carried from its original home in the Himalaya Mountains into North Africa and thence from one country to another. Rhazes, who prior to the year 923 was doctor for the Kalif in Bagdad, used the berries for medicinal purposes. Constantinus Africanus, who traveled extensively in the eleventh century while studying the medical arts of the Arabians, and who later was Director of the Medical School of Salerno, is credited with having been the first man to bring knowledge of the barberry plant to Europe. From the Mediterranean lands the bush moved into northern Europe then later into North America.

Wherever it went the shrub received a warm welcome. Medical men of the eighteenth century recommended the juice as a remedy for scurvy, bladder trouble, jaundice, loss of appetite, and fever. Water in which the bark had been boiled was used as a mouth wash. The crushed seeds were thought to have merit as a poultice. The bright yellow wood of the roots served as a source of dye and ink. The fruits were used in the making of jelly and "the good tasting healthy English drink" called punch. The tough wood made excellent teeth for rakes. Moreover, with its close growing, heavily thorned branches the barberry found favor as a hedge plant, useful for separating fields. And one thing which perhaps had no little to do with its popularity is the fact that the common barberry is a beautiful plant, whether one views its drooping yellow flowers in the spring, its green growth in the

[1] Abstract of an illustrated lecture delivered at The New York Botanical Garden, March 18, 1933.

summer, or the innumerable bright red berries against the winter snow bank.

Discover Menace of Barberry

With the passage of time, however, grain farmers came to associate rust losses with proximity of fields to barberry bushes. As early as 1660 peasants in the vicinity of Rouen, France, made determined efforts to rid their communities of the bush. Later, in England, there was a virtual barberry war between farmers and land-owners. Still this popular shrub traveled on and in 1796 Timothy Dwight, President of Yale, in reporting on a journey to Berwick, Maine, told of the difficulties which farmers of eastern Massachusetts were having.

"The bush," he says, "is, in New England, generally believed to blast both wheat and rye." In his account he tells us of observations in Worcester County, Massachusetts, which substantiate the belief. An indication of the attitude towards the barberry is given by the fact that eradication laws were passed in Connecticut in 1726, in Massachusetts in 1754, and in Rhode Island in 1772. The Statute of 1726 in Massachusetts began as follows:

Preamble. Whereas it has been found by experience that the blasting of wheat and other English grain, is often occasioned by barberry-bushes, to the great loss and damage of the inhabitants of this Province,—

Be it therefore enacted by the Governour, Council and House of Representatives,

Barberry-bushes to be extirpated on or before June, 1760. (Sect. 1.) That whoever, whether community or private person, hath any barberry-bushes standing or growing in his or their land within any of the towns in this province he or they shall cause the same to be extirpated or destroyed on or before the tenth day of June, Anno Domini one thousand seven hundred and sixty.

Further provisions for carrying out the work followed.

Study of circumstances surrounding the passage of these laws indicates that the farmers acting on the basis of their own observations were proceeding in the face of advice of scientists of the day.

As we all know, early efforts to eradicate barberries in New England were not successful, and with the trek of the covered

wagon and the progress of the "iron horse" the shrub moved westward into the very heart of the nation's grain-producing areas. Birds were attracted by the bright red berries and spread the seeds to fence rows, woodlots, and river banks. Running water and animals aided further spread, and the stage was soon set for the rapid increase in grain losses due to rust which have led us to call the barberry a "billion dollar berry."

For while this shrub was steadily traveling to new land, scientists were forced to revise their views with regard to its harmless character. It was in 1865 that de Bary, a German botanist, revealed the life history of the rust fungus. Discussing the development which followed, Dr. Asa Gray of Cambridge wrote:

"The effect of barberry-bushes in rusting wheat, after having been long accounted a groundless popular superstition, is at length understood and admitted by the cryptogamists. The botanists used to rebut the farmers by the statement that the rust in the grain-fields and the prevalent fungus of the barberry belonged to very different genera, and that therefore the one could not give origin to the other. But de Bary in Germany and Oersted in Denmark, following up similar inquiries by Tulasne in France, have concluded that Uredo, Puccinia and Aecidium are to be regarded, not as so many genera, but as three successive forms of fructification of the same fungus, or, in some sort, an alternation of generations."

In the course of the research which followed the initial work by de Bary, it was found that in northern climates the common barberry is a necessary spring host plant for the fungus which causes rust. It was found that the fungus lives over the winter on straw and wild grasses in the form of thick-walled black spores. With the coming of spring these germinate, but are unable directly to infect the new grain crop. Instead, small spores are released in quantity into the air. If one of these is carried by the spring breeze to a newly opened barberry leaf, it is capable of causing an infection which results in another type of spore. It has been estimated that under most favorable circumstances more than 64,000,000,000 such spores may be produced in one of several spore crops on a single barberry bush. The spores formed on the barberry, if blown to a field of wheat, oats, barley, or rye, are able to

germinate and attack the growing grain plants. The red rust pustules then appear on the stems of the grain, opening the way for loss of water from the plant, resulting in either complete loss of the crop or shriveled, poor quality, light-weight grain. The red spores which form in these pustules on the grain stem are blown to other nearby grain fields where they start new infections. As the crop nears maturity the black spores, protected against winter weather by thick walls, appear in the pustules and these live through the low temperatures in straw stacks and on stubble, ready to start the spring attack on the barberry.

Campaign in United States

Knowing this relationship, it is not difficult to understand how our spring-wheat farmers in 1917 and 1918, following disastrous rust losses at a time when the world was calling for bread, initiated the barberry eradication campaign. Following the example set by Denmark, Germany, and other European countries, war was declared on common barberry in thirteen spring-wheat producing states of the middle and northwest.

The purpose of this eradication campaign, started in 1918, is to stabilize grain production and to improve the quality of small grains by preventing widespread epidemics of stem rust. By providing insurance against crop failures due to rust, the cost to the farmer of producing grain is reduced, and with the added assurance of more uniform yields the way is opened to avoiding abnormal marketing conditions.

From its beginning, millers, grain dealers, railroad officials, and other business men have joined hands with state and federal agencies in what has been termed one of the greatest of all coöperative plant-disease programs. The task was tremendous. Farm yards, town and city lots were planted with highly prized shrubs. Barberries had been given as premiums by nursery salesmen and were often planted in out-of-the-way corners in orchards. From these planted bushes, berries had been carried by birds and other agencies to fields and timber lands. In some sections barberries were growing so thick in pasture lands as seriously to interfere with their use. After almost fifteen years of continuous effort more than 18,500,000 bushes have been destroyed. In some states bushes are now few and scattered, in others there are still concen-

trations of bushes the removal of which necessitates considerable manual labor.

This accomplishment has been made possible only by continuous coöperative effort, not only in location and eradication of bushes but also in education of the general public. An important phase of the program has been the spread of information through the press, agricultural extension agencies, fair exhibits, and the public and denominational schools. Work with schools has been most productive. Resulting from this we have a generation growing up in cities and country which understands the dangerous character of the barberry. Moreover, school children are of direct assistance in finding bushes. Through their activities more than 66,500 bushes have been destroyed since 1930.

Evidently this eradication program, started by the farmers of North Dakota, has been well worth while, for as the number of rust-spreading barberries destroyed has increased, losses from rust have steadily diminished.

Losses Now Negligible

For example, in the thirteen north-central states of the eradication area, the average annual loss to wheat for the 5-year period 1916–20 was approximately 57,704,000 bushels; for the 5-year period 1921–25 the average annual loss in these states was roughly 17,867,000 bushels; while for the 5-year period ending 1930 the average annual loss to rust was estimated at 9,641,000 bushels of wheat. Last season, in spite of the fact that weather conditions were especially favorable for the disease, losses were negligible.

The barberry-interested public, landscape gardener, and nurseryman need suffer no hardship as a result of this disease-control program. Barberries other than *Berberis vulgaris* have replaced this plant in popularity. Meanwhile the Department of Agriculture has carried on a program of testing all species, varieties, and hybrids with a view to determining their reaction to the rust fungus. Best known of the plants which may safely be distributed in grain-producing areas is the Japanese barberry. Among the rust-resistant evergreen plants are *Berberis repens, B. Aquifolium, B. Darwinii, B. triacanthophora, B. verruculosa,* and *B. Sargentiana.*

When we review the history of stem rust throughout the world, when we realize that since 1916 in the United States alone, rust losses to grain have mounted to more than $750,000,000, and when we consider the relationship of the common barberry to this disease, then the first handful of berries which were carried many years ago from Mediterranean lands into the north may well be termed "billion dollar berries."

F. C. MEIER,
Principal Pathologist in Charge, Division of Barberry Eradication, Bureau of Plant Industry, United States Department of Agriculture.

WILD FLOWERS OF THE ALLEGHANIES[1]

This thoroughly readable and profusely illustrated book of 670 pages includes the flowers both of the main range of the Alleghanies and of the Blue Ridge Mountains. The descriptions make no pretense to botanical completeness, but instead give such clear characterizations in non-technical language as to bring to the average person vivid pictures of the flowers themselves.

For instance, his characterization of the May-apple by its umbrella-like leaves, with the accompanying illustration showing the habit of the plant, is fully as satisfactory as a much longer technical description might be, and the interesting facts about its absence of nectar, about its fruit, and the poisonous character of its leaves are no less interesting than the authoritative comment about its medicinal value. Mr. Harned is a pharmacist of long experience in his home at Oakland, on top of the Alleghanies in Maryland, as well as an enthusiastic botanist and wild-flower student.

Mr. Harned's comments on the ecology and associations of the plants and interesting references to historical facts add materially to the readability of what might otherwise be a rather bewildering list of plant names and descriptions. The numerous illustrations and photographs dealing with every family in detail and showing pictures of a great many of the commoner flowers make the book thoroughly practical for the non-technical enthusiast.

[1] Harned, Joseph E. Wild flowers of the Alleghanies. Pp. 1–670. Press of The Sincell Printing Company, Oakland, Maryland, 1931. [illust.]

His glossary and key to the plant families are both quite individual, the glossary being arranged by the plant parts, under the seed, roots, stem, etc., as well as listing the words alphabetically. Thus he brings together the terms referring to a particular part, making it easier to follow his distinctions between them. These are further illustrated by excellent drawings, as is each of the plant families treated. These latter are taken up in the order of systematic relationship and one seeks out the family either by the pictures or by his analytical key.

The introductory remarks, telling not only about the scope of the book, but about unusual plants, and the comment of the florist, William Weber, on the cross-fertilization of flowers, all add to the breadth and interest of his treatment. He also gives an excellent check list of the ferns, though this group is naturally outside of the scope of the work. The paintings and drawings by Miss Mary Eaton and Mr. F. S. Mathews add both to the attractiveness and value of the work as a whole. All flower enthusiasts throughout the eastern states will find this book a welcome addition to their libraries and a most acceptable companion on their woodland rambles, whether they be trained botanists or amateurs.

FORMAN T. MCLEAN.

CELSIA CRETICA

An interesting biennial for flowering under cool greenhouse conditions is *Celsia cretica,* a plant allied to the Verbascums or mulleins and a native of the Island of Crete in the Mediterranean. When well grown this subject produces a stout stem which attains a height of four or five feet. The lower portion of the stem is well furnished with broad leaves which almost completely hide the pot from view and are of a vigorous rich green color. The upper portion of the stem is strict or sometimes branched and bears the flowers arranged in a rather dense spike. Each flower is about two inches in diameter with the three lower petals of a creamy-yellow hue and the two upper somewhat deeper. Towards the base of the upper petals are chocolate-brown markings and the two upper stamens are fuzzy with hairs of this same color. Individual flowers remain expanded for several days and a long succession is maintained as the spike develops.

FIGURE 1. A native of Crete in the Mediterranean, *Celsia cretica,* when grown in America, makes an excellent decorative greenhouse plant blossoming in early spring.

Celsia cretica is readily raised from seed, which it produces freely, and is easy of cultivation. The seed is small and for best results should be sown toward the end of June in pots or pans. When the seedlings are of sufficient size to require transplanting they may be transferred to flats, allowing a distance of two inches each way between the seedlings. When they begin to crowd each other in the flats a move to pots four inches in diameter is in order. *Celsia cretica* is a strong-rooting plant demanding a rich soil for its best development, therefore liberal quantities of cow-manure and bone-meal should be incorporated with the potting soil. No advantage is gained by giving pots larger than the six-inch size as finals, but feeding with liquid fertilizers should receive attention in a generous manner when these are filled with roots.

Cool growing conditions with ample ventilation are essential. In general the night temperature during the winter months should not exceed fifty degrees, but if flowers are required for an early date five or ten degrees higher may be given for a period after the buds show. I have carried plants safely through the winter in a cold-frame and these flower later than those grown throughout in the greenhouse. A little shade during their early stages and again when the buds commence to open is advantageous.

T. H. Everett.

A GLANCE AT CURRENT LITERATURE[1]

Plant diseases reported in 1932 throughout the United States have been listed in supplement 85 to the *Plant Disease Reporter,* issued June 15 by the United States Department of Agriculture. Jessie I. Wood, Neil E. Stevens, and Paul R. Miller are the authors of the work. Diseases of cereal, forage, fruit, nut, vegetable, and special crops and of trees and ornamentals have been compiled in this large mimeographed pamphlet.

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The "Ethnobotany of the Forest Potawatomi Indians" is the fourth study of the six Indian tribes of Wisconsin to be published by the Public Museum of the City of Milwaukee. This last has

[1] All publications mentioned here—and many others—may be found in the Library of The New York Botanical Garden, in the Museum Building.

appeared in volume 7, number 1, of the Museum's *Bulletin*. The author, Huron H. Smith, who had spent many years in close contact with the Indians while he studied their knowledge and customs, died February 25 of this year, with two of the series still uncompleted.

* * * *

Studies on mosaic and related diseases of dahlia occupy the second quarterly edition of *Contributions from the Boyce Thompson Institute for 1933*. Philip Brierly, of Cornell University, carried on the research in coöperation with the Institute and with The New York Botanical Garden.

* * * *

The efficacy of jewel-weed as an antidote for ivy poisoning is disproved in the May–June issue of *Torreya* by Ralph C. Benedict, who performed an experiment on himself. The jewel-weed aggravated the poison, he said.

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Horticulture for June 15 gives practical instructions for raising from seed plants that are usually bought when half grown. In the same issue, J. Horace McFarland describes the new white Darwin tulips.

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The June *Journal of Economic Entomology* contains much information of practical value to the home-owner and gardener. C. A. Weigel and Floyd F. Smith write on the "Present Status of the Gladiolus Thrips in the United States," a study which is followed by several additional articles on this pest. "Diseases Threatening Ornamental and Forest Trees" is the subject of R. Kent Beattie. "The Insects and Diseases of Rhododendrons and Azaleas" are treated by Richard P. White. A. F. Burgess deals with "The Present Status of the Gipsy Moth." In addition, a spray service for vegetable crops operating in the vicinity of Chicago is described.

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The work of disease control among crop plants and the introducing and testing of new foreign varieties of plants are described by Dr. William A. Taylor in an article entitled "Research in the Bureau of Plant Industry" in the July *Scientific Monthly*.

Carnivorous plants are the subject of Francis E. Lloyd, of McGill University, in a review with contributions recently published by the Royal Society of Canada.

* * * *

Bishop of Llandaff, a new crimson bedding dahlia, which is recommended by *The Gardeners' Chronicle* in its issue of June 3, may be seen in the dahlia border at The New York Botanical Garden this fall.

The previous issue (May 27) contains many photographs of the Royal Horticultural Society's exhibit at Chelsea; also the first of a series of articles by Dora Stafford on plant hunting in the Andes of southern Peru.

Photographs and a complete description of Chatsworth, or the "Palace of the Peak," in Derbyshire, near the River Derwent, occupy much of the issue of July 1.

* * * *

The Gardeners' Chronicle of America for July briefly describes the horticultural exhibit at the Century of Progress exposition in Chicago, and recommends it as a place for every gardener and horticulturist, amateur or professional, to visit. In the same number, the great British flower show at Chelsea is reviewed.

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New iris of 1933, fall-blooming iris, roses, and gladiolus are leading topics in the July *Flower Grower.*

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Leaflet 95 of the United States Department of Agriculture, issued in June, tells how to control ragweed, for the benefit of hay-fever sufferers.

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The value of peat moss in transplanting is explained in the May *American Forests* by Homer L. Jacobs, who shows photographs of the root growth of a number of seedlings.

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Shrubs having evergreen leaves or attractive fruits in winter and early spring are listed in the Arnold Arboretum *Bulletin of Popular Information* for April 18.

The effect of sword-shaped leaves, soft-textured foliage, and dark lustrous leaves in different types of gardens is described and illustrated by Judson P. Smith in the May *Gardeners' Chronicle of America.*

* * * *

L. C. Everard of the American Association of Museums has compiled a catalog of the zoölogical parks, aquariums, and botanical gardens of the United States, listing them by states. The history, extent, and activities of each are outlined.

* * * *

Two serials describing important agricultural regions of the world are running in *Economic Geography.* In the April issue Samuel Van Valkenburg treats of India in the Asiatic series, and Oliver E. Baker describes the Columbia Plateau wheat region in the North American series.

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

Under the auspices of the National Research Council of Canada, the fifth meeting of the Pacific Science Congress was held at Victoria and Vancouver, British Columbia, June 1 to 14. Previous congresses have met in Honolulu, Sydney and Melbourne, Tokyo, and Batavia.

The congress just held was distinctly successful, being attended by some 200 delegates from Canada, the United States, Mexico, the Argentine, Chile, England, France, Sweden, Holland, Hawaii, Japan, China, the Philippines, Hong Kong, British Malaya, and Australia. More than 600 papers were presented in the general symposia and in the section meetings, covering both the physical and biological sciences. Local excursions to points of interest were arranged in both Victoria and Vancouver, with a post-congress tour over the Canadian Pacific lines and by automobile to Calgary.

Dr. E. D. Merrill, Director-in-Chief of The New York Botanical Garden, presented one paper on the plants of pre-Columbian agriculture before the general congress symposium on the origin of the American aborigines, and one on the gymnosperms of Poly-

nesia, Malaysia, and the Philippines before the botanical section. He also took part in various discussions.

Dr. Ivan Kášterský, of the National Museum, Prague, has recently sent to The New York Botanical Garden for identification about 2400 specimens from the Malaspina Expedition collections of Thaddaeus Haenke (1789–94). This material is from Vancouver Island, the Philippines, the Marianne Islands, Mexico, Peru, Chile, Ecuador, and Panama. It represents the unnamed specimens of Haenke's collection, material that was not studied by Presl. About one half the collection is represented by single specimens, which are to be returned to Prague after identification, the remainder being duplicates to be retained for the herbarium of The New York Botanical Garden.

Dr. A. B. Stout spent a week during June at the State Experiment Station at Geneva, N. Y., in further work on the project of breeding for the development of hardy seedless grapes. Already 28 seedlings have been produced which have seedless or nearly seedless fruit and which are fully hardy in the climate of central New York. Several of these seedlings possess considerable merit and the best of them are being propagated for trial in vineyard culture.

The Metropolitan Gladiolus Society has announced two meetings and informal flower shows to be held at The New York Botanical Garden on the afternoons of August 3 and August 24. All kinds of garden flowers, as well as gladiolus, may be exhibited and will be judged for the first, second or third prize rating. The Society has special medals which it may award to specially fine exhibits. Members of the Garden and their friends are invited to participate both by exhibiting in and attending these showings. Flowers for exhibit should be staged in the Museum Building on or before two o'clock of August 3 or August 24.

PUBLICATIONS OF

THE NEW YORK BOTANICAL GARDEN

Journal of The New York Botanical Garden, monthly, containing notes, news, and non-technical articles. Free to members of the Garden. To others, 10 cents a copy; $1.00 a year. Now in its thirty-fourth volume.

Mycologia, bimonthly, devoted to fungi, including lichens; $5.00 a year. Now in its twenty-fifth volume. Official organ of the Mycological Society of America.

Addisonia, quarterly, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Subscription price, $10.00 a year. [Not offered in exchange.] Now in its eighteenth volume.

Bulletin of The New York Botanical Garden, containing reports of the Director-in-Chief and other official documents, and technical articles embodying results of investigations. Free to all members of the Garden; to others, $3.00 per volume. Now in its fourteenth volume.

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ROBERT A. HARPER

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JOHN K. SMALL

PLANT FORMS IN ORNAMENT
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PUBLIC LECTURES DURING SEPTEMBER, OCTOBER, AND NOVEMBER

A GLANCE AT CURRENT LITERATURE
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NOTES, NEWS, AND COMMENT

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PLANT SCIENCE IN THE SERVICE OF ART*

Botanical gardens in anything like the modern sense date perhaps from the 16th century and were largely gardens of herbs and simples in connection with monasteries and more or less in the service of medicine. As a matter of fact, these earliest gardens were, however, repositories of all that was known about plants, including their methods of propagation, as well as of the plants themselves. The knowledge of horticultural and agricultural practices runs back, of course, to prehistoric times and it is illuminating as well as surprising in a sense to realize that the origins of most of our refined methods in horticultural and floricultural practice, as well as the production of all our important food crops were far back in prehistoric times, antedating even folk-lore and tradition. The origins of horticulture and agriculture passed early into the domain of mythology, which is only another way of saying that apparently there could be no other form of art, science, historic records, or perhaps even folk-lore till horticulture and agriculture were already well advanced. We think of our age as that of practical discoveries and inventions. We have seemingly just found out that there are horticultural discoverers and inventors and that their inventions should be patented. But compare the claims for patents granted for new roses, so like many other roses that we can hardly be sure of their identity, with the invention of corn or wheat, both of which are so different from any known wild plant from which they may have been derived by that primitive prehistoric man or woman who first pro-

*An address given at the dedication of the Morris Arboretum of the University of Pennsylvania at Chestnut Hill, Philadelphia, June 2, 1933. Reprinted by permission from the Proceedings at the Dedication of the Arboretum.

duced them that modern science has never been able to decide with certainty just what their parents really were. Just now many claims are made that with Mendelism the mechanics of heredity are thoroughly understood. It is said, too, that corn is the best-known plant from the standpoint of its genetical make-up and behavior. Yet in spite of this intensive scientific study, no one has been able to produce corn again from its wild relatives as did that old farmer, or was it his wife, who lived in the uplands of Mexico or the Andes so long ago that we are finding actually fossilized ears of his product. All this is merely to say that in dedicating this new foundation to the further improvement of man's understanding and control of the life of plants we are only developing more perfectly that first, oldest, and throughout the ages most vital and essential of all man's relations to his environment.

There is perhaps an element of presumption in suggesting as my title does the possibility of sympathetic working relations between science and art. The warfare between science and art is probably little less ancient than the warfare between science and religion. That it has perhaps been less advertised and less bitter and destructive may be evidence that the cleft between science and art is not so deep nor so indicative of fundamentally diverging aims and view-points, or it may be proof that the artist is by nature a more tolerant individual than either the scientist or theologian. Both plant science and the arts were in earlier days foundlings, as it were, who were nurtured and used in the service of religion. Our early botanical gardens were supported by the church as part of its service to the community. That the service of modern plant science to the body politic and economic has been adequate and appreciated is certainly most convincingly proved by the fact that a department of botany in a university has been to such a degree entrusted with the care and further development of this splendid work of art, the Morris Arboretum.

We may well be proud of our record as plant scientists. Having been set the task of making two blades of wheat grow where one grew before we have produced so much wheat as well as corn, potatoes, fruit, etc., that on every hand the markets of the world are glutted and our statesmen and economists are working feverishly to limit production, to find new markets, and to remove

from cultivation the so-called "marginal lands" which plant science was busily and successfully engaged in bringing up to a normal rate of yield for old crops, as well as in breeding or discovering new crops especially suited to them. We must admit that plant science has been well on the way toward working itself out of a job! Our political economists and social philosophers are even doubtful whether it would be well to reduce further the cost of production of our staple crops by improved methods of culture and disease control. Since Pennsylvania, under the lead of Dr. Nixon of your State College, taught her farmers to break all records of potato production by plowing under the common weed sweet clover, it seems really questionable whether further progress in these lines is worth while. There can be such a thing as too many potatoes and apples as well as too much corn and wheat. Of course, we shall keep on fighting our deadly enemies, the insects, which Dr. Howard tells us in the long run are bound to succeed us as dominant world types of life. With all this it is certainly a proud record of scientific achievement to have shared as largely as plant science has in freeing human society from the incubus of the Malthusian nightmare and to have re-established on broad and deep foundations—that fundamental and original source of all hopeful reaching out of the human spirit toward progress in physical, ethical, and esthetic development—the confident conviction that the ample bosom of mother earth is fully able to nourish and cherish all the possible millions of living beings that may spring from her loins. Malthus in his absorption in the law of diminishing returns failed to take account of the then less recognized but much more fundamental law of the geometric rate of increase of all those simple organisms of the soil and waters which are building over the physical world into the world of life and reactivity. He also failed to realize that the farmer wishing to double the number of acres plowed per day would not try to make old Dobbin trot with the plow but would invent the tractor. How much did the idea of the tractor cost in energy units? We have not yet been able to catch an inventor and shut him up in a respiration calorimeter at the moment when a great new idea dawns in his mind, but such evidence as we have indicates that translating poetry, doing mathematical problems, and probably making water-color sketches for new botanical gardens is vastly

less expensive in food energy than sawing wood, pedaling a bicycle or any of the other forms of human labor which the technocrats assure us are to disappear with the full mechanization of life. The ages yet to come are to be cheap in food, clothing, and shelter costs. Can we make them rich in social, moral and aesthetic returns? This is the new problem.

A New Deal in Plant Science

Can plant science in the service of art help to solve these problems which follow and so largely arise out of its methods of subjugating nature and making her over into the bountiful mother none of whose children need lack the necessaries of life? Primitive man's struggle for existence was a food and shelter struggle. To meet his problems the forests must be destroyed together with the wild life they harbored. But our great food and fibre crops, coal and iron mines, factories, cities, and railroads have all contributed to make food, clothing, and apartment houses *too cheap,* say the economists.

That for this future new plans, new outlooks, new alignments, a new deal in plant science as well as in politics is called for, it seems to me is obvious. Plant science may well be proud of its record. Few will claim, however, that the beauties of nature have not suffered in this mechanization of life.

Can science in the service of art repair some of the wastes and destruction that have accompanied our subjugation of nature to our physical needs? For aid in these new problems it seems to me plant science must seek new alliances in fields where other than material and financial returns have recognized values. Plant science has done its part in helping its sister physical and biological sciences in the rough work of hewing out an empire of human liberty and of food plenty and shelter plenty from the vast and unused resources which our fathers found in this new world. We confess our sins in having ruthlessly wasted so many of our forests, so much of life in the wild creatures of our woodlands and prairies, and in our factory-poisoned lakes and water courses. We admit our failure to have adequately shared our new-found wealth and physical comforts with the native races which preceded us.

What will one hundred years hence show? Shall we have made two century-old trees grow where one grew before? Shall we

have covered every waste, treeless and denuded hill and valley with the verdure that absorbs and vitalizes the energy of the warm sunlight as well as protecting the soil beneath? Shall we have made the copper and iron smelter, the coal and oil consuming factories return their wastes to the earth and air as food for plants rather than as noxious gases deadly to man and plant life alike?

We are just now, when quarantines are forced upon us, realizing as never before how little we have done toward developing our own trees, shrubs, and flowering plants into the improved and highly adapted types which are the necessary materials of forestry and landscape art. As one artist has said, we are evergreen crazy, but how few of our own native conifers are used as compared with the countless beautiful varieties which come to us from the Old World, most of them, too, not really hardy here and thus making "replacements" the bane of the landscape artist, though the source of false profit to the nurseryman.

Shall we in the century to come have transformed our native vegetation as Japan transformed her wild cherries, irises, maples, wisterias, and cypresses, etc., into friendly, thrifty adornments of her homes and gardens, glad to exchange the rough exigencies of wild life for the protection of cultivated parks, forests, and gardens?

I am glad to have this opportunity to refer to the outstanding achievements of Japan in horticultural art and science just now when we are all so inexpressibly shocked by Japan's treatment of her old neighbor and co-laborer in horticultural art, China. That some of Japan's present-day gardeners tell us that her garden lore and garden creations were the work of a bygone age, the feudal period of the Samurai, and that now she has adopted under our influence and example the ideals and the standards of western science and civilization, as we exemplify them, may give us very serious food for thought.

Is the Japan of today the Japan of modern science, as the Japan of the Samurai was the Japan of garden, pictorial and plastic art? If so, our friends, the landscape artists, may well look askance at the proffered service of plant science. Life is a complex, as complex as are the surroundings in which it is so deeply rooted. Man reacts to the crudity of untamed nature with

the ruthlessness he there finds. He creates science to give him understanding and control of his environment and himself. He creates art as the expression of his joy in understanding and control.

Women's Part in Human Progress

If in this new world the next century is to repair the physical, biological, and aesthetic wastes of the three centuries since our stern Puritan forbears landed at Plymouth and began to subdue nature to their needs for liberty, it is high time we were about it, and one of the hopeful signs that the new generation takes its big new job seriously is the creation of such foundations as this of the Morris Arboretum. Perhaps that a woman should have felt the impulse and so largely developed the plan for this new enterprise of civilization will be found in the future quite as significant as that women vote and are the rivals of men in business and the professions. As I have noted above, there are many that hold that woman was the gardener in the primeval family, and the woman's garden club movement of the present, with its emphasis on aesthetic values, may mark as long a new step in human progress as did the change from nomadic to agricultural and horticultural life for primitive man.

But what may science offer to art in this new coöperation for the repair of waste and the further development of nature's landscape beauties? In the new age the first requisite in a botanical garden, an arboretum, a city park, a national forest preserve, is that it be beautiful. But what does science know of the canons of art? It is here also that, in landscape art, art itself finds new relations. The picture that is alive and is to grow and mature through the centuries must not depend upon refinishing or replacements. It must be made of healthy, vigorous materials chosen for their adaptation to climate, habitat, soil, and air; brought together from all the world for the particular needs and possibilities of the given location; bred and selected with reference to needs and possibilities not met by any wild and unimproved forms. The collection from all the world, identification, breeding, and selection of new types involve many scientific problems to be solved in getting the materials with which the landscape artist works.

In my opinion there is a wide field for coöperative effort by landscape art and plant science in which the aims of each are mutually advanced. For example, there is a whole series of so-to-speak long-time problems as to tree growth, silviculture, etc., in solving which the knowledge of what to plant, when and how to plant, and where to plant can be increased for the benefit of landscape art in the future at the same time that very fundamental problems in the physiology and reproduction of plant life are being solved. By such coöperation our parks and gardens may be made not only to show the best of scenic beauty which gardeners and artists can now produce, but may contribute vitally to the solution of problems involving such long periods of time and such careful control of conditions that they can only be attacked successfully in endowed institutions, whose policies and efforts are not subject to such fluctuations as are inevitable in politically controlled state and national agricultural and horticultural institutions. While Government agencies, such as the National Department of Agriculture, and the State Agricultural Colleges and Experiment Stations, have fully proved their value and justified invoking the taxing power of the state for their support, they can by no means meet the needs of the situation as it now exists. The activities of government bureaus and state experiment stations must always, from the nature of their sources of support, aim to meet immediate exigencies in agriculture from year to year, and especially they must devote themselves to the work of directly aiding the farmer and nurseryman in the application of known methods of culture, crop-feeding, and the prevention of disease. The work of their so-called extension departments more or less dominates their activities. For example, their service in the prevention of plant diseases is rather that of practising physicians than of research pathologists. We have reached a period in plant science where further advance demands the organization of experimental studies extending over long periods of time, and requiring in many cases costly apparatus. It is difficult to attempt such work in institutions under more or less changeable political control. For the successful prosecution of fundamental research the endowed institution with its more stable organization is practically indispensable. Nowhere is this more obvious than in the case of research on the basic problems of

plant growth and reproduction and the methods of control of plant diseases. If we are finally to work out the unsolved problems that just now so conspicuously neutralize our efforts at silviculture and reforestation, we must attack them under conditions where continuity of effort is assured and where immediate evidence of adequate financial returns for this outlay of time and effort is not required or expected. We must develop a system in which we expect and obtain our immediate returns in the beauty of the materials and the broad human interest in the perfections of well-planned plantations in our botanical gardens and our state and national forest preserves. This calls for genius in planning but even more for the preservation of accurate scientific data as to the identity and source of plant materials, methods used and results achieved in growing them. In a word, if we are to solve the fundamental problems of silviculture and reforestation we must provide for taking our returns in the artistic beauty of the materials and their disposition as well as in the commercial value of the finished product.

This would seem to be so simple and obvious a matter as to have made it the commonplace of all botanical gardening and park practice. But the facts are quite otherwise. While botanical gardens and parks have accession records, meteorological data, etc., it is only in rare instances that planting is really treated as at once the production of a decorative landscape picture and at the same time an experiment in the behavior of the species used under the conditions given. The reason is that in our tendency to specialization the ideas of the experimental plot or grove and the decorative plantation have become separated at a serious loss to both. The experimentalist suffers from lack of popular support and interest for the long periods necessary to get trustworthy results on matters of tree growth, and the landscape artist, when a plantation does not thrive, is quite at a loss as to why it failed or how to avoid such failures in the future.

It is only in the coöperation of the artist and the scientist that the aims of both can be most effectively achieved. Coöperation is, of course, difficult; but the conspicuous failures in many city parks and private estates and in national forest preserves show that the need is great. The opportunities open before an institution like the Morris Arboretum, which is so fortunate as to com-

bine close relations with the scientific departments of a great university and an organization whose avowed aim is to advance by demonstration the interests of the highest types of landscape and gardening art, are quite unparalleled.

Probems for Future Research

I may briefly enumerate some of the problems in which such coöperation is likely to be most successful. One of the most important lines of experiment is in the possibility of tree feeding as a substitute for soil deficiencies and of soil treatments as a corrective for injurious soil conditions. We are confronted on every side with the claims of would-be tree doctors as to the lack of tree foods in the soils of our parks and gardens, but a recent analysis of all available data indicates that none of the methods proposed have been shown to give consistently beneficial results.

Other problems involve long-time studies of: Seasonal periodicity in root growth, especially in trees; The relations of scion and stock in grafting and budding; Graft hybridization as a means of producing new decorative types; Sexual hybridization of trees, especially the evergreens, as a means of producing new types, increasing their rate of growth, and especially improving the fibre qualities to avoid the chemical treatments which give us the very short-lived papers which we now use so profusely; The effects of atmospheric pollution and the means of its control; Soil microorganisms as affecting the availability of soil salts and atmospheric gases; The so-called biological control of plant diseases by producing immune races and by introducing the natural enemies of insect pests. These are but a few of the numberless lines of research which require the far-sighted planning and permanent organization of an endowed institution.

The true nature of the work that lies before us if we are really to repair the wastes of the past, close and heal the deep scars with which we have defaced the beauties of nature, and further, really utilize to the full the possibilities for supporting life of this world in which we live is, broadly speaking, that, in terms of the market place, it does not pay. Why have we not replaced the forests we have devastated? Because by none of the known methods of present-day forestry can silviculture be made to yield a crop which in terms of dollars and cents will pay initial cost, upkeep,

overhead, amortization, harvesting, marketing of raw materials, manufacturing, and high-pressure selling of the finished product. The economist has the plant scientist beaten before we begin. Any scientist knows without trying that a crop of century-old oaks or even white pines cannot be grown at a financial profit. As a financial investment such a proposition does not rank up even with South American government bonds or German industrials! To be sure, plant scientists are optimists and there were those who thought that even if century-old oaks could not be grown at a profit, poplars for paper pulp might be. But a world-wide depression like the present has sufficed to prove that also was a wild-cat proposition from the economic point of view.

But science does not admit defeat. The need is real to grow century-old oaks, white pines and redwoods, or other species, just as large, just as lusty, just as imposing, as nature grew before science was discovered. The scientist believes it can be done, though he admits his efforts at forestry under the whirligig conditions of government control are not going to save his job when taxes must be reduced.

This is the age of science and nobody doubts but that by and large science pays in terms of dollars and cents. It is notable, however, that the great achievements in recent science have been in the fields of laboratory and factory experiment in which, while the problems to be solved call for the most intensive effort and frequently expensive apparatus, there is nothing quite so insuperable as the element of time which is involved in silvicultural and many other fields of plant scientific experiment.

Growing trees is strictly a long-time proposition. The preliminary experiments, the needed inventions, the testing of methods—each involves problems which already are age-old. Plant science realizes how many mistakes have been made in efforts at establishing forest nurseries, forest planting, forest care, and forest protection. Before silviculture can be made as sure as wheat and corn culture, many, many long-time experiments must be made under controlled conditions.

Experiments for Art's Sake

There is, however, a field of human effort which has never submitted to the domination of the underwriters' system. "Art for

Art's sake" on the whole has proved quite as durable a human dogma as "Will it pay?" The sculptures of Greece and the paintings of the Renaissance and the literature of the Elizabethan period have kept their hold on human interest and been proved through the centuries to pay in beauty and human satisfaction. Can landscape art make its creations so vital to human interest that the growing of trees and shrubs and herbs in an arboretum and in national forests will be supported for the satisfaction they afford to the sense of beauty and artistic appreciation in the masses of our great democracy? This is the problem which plant science and landscape and gardening art must jointly solve. Will the public pay taxes, will wise and far-sighted men and women establish foundations and endowments, and take part of their returns in the beauty of the parks and forests, as they grow? It is interesting to note that the state of California in its very successful "Save the Redwoods" crusade has appealed very largely to this sense of the art value of their majestic forests. But the "Save the Existing Redwood" movement has carried with it extensive and in some cases at least, as I am informed, quite mistaken efforts at reforestation. It is perhaps almost as indefensible artistically and and scientifically to plant thousands of baby redwoods by methods and in locations which from the start doom them to immediate or early death, as to cut down the giants themselves. We must count the cost not only of the time required to grow a giant tree but of learning where to plant and how to protect the growing young stock.

Can we make our experiments things of beauty so that the returns in beauty and human interest are continuous? That with growing age a successful forest yields larger and larger dividends of beauty as well as material products without increasing costs for overhead and upkeep is all to the good from the economist's standpoint as compared with enterprises in which wear and tear and depreciation are so large a factor in determining returns. The creations of the landscape artist increase in value with age without those risks incident to repair and refinishing which are such important elements in the value of the works of the old masters of plastic art and painting. To work with forms and colors that grow and replace themselves with the seasons is perhaps the

most difficult and in this respect certainly the most unique of all the forms of artistic expression.

That landscape art in this country is really coming into its own is evidenced by many notable recent events, among the chief of which is the establishment of the Morris Arboretum, thus making permanent these splendid plantations of Compton and Bloomfield. This pre-eminence is to me not alone a matter of the beauty of its location and the extent and the perfection of its plantations as they now exist but especially, as I have tried to emphasize, for the close connection provided by its founders with a great department of botany with a distinguished record of achievement in many fields of plant science and itself a part of a great university, thus assuring the coöperation of all fields of biological and physical science in its direction and development.

Other Recent Landscaping Developments

But the Morris Arboretum does not stand alone as an index of this new interest in the highest expressions of landscape art. That at practically the same time your sister institution, Swarthmore, finds provision for organizing its college plantations as a second great arboretum is quite in line with the record of the Philadelphia region from the earliest times as the centre for the highest forms of development of plant science in America. And at the same time that I am so gladly testifying to the historic and present-day pre-eminence of Philadelphia in all matters of New World gardens as well as the prime significance of the present occasion for the future development of plant science and garden art in America, I may be permitted perhaps as a New Yorker to mention two enterprises now under way there which indicate a deep and whole-hearted interest in the development of parks of the highest type from the artist's standpoint and which in their maintenance in the perfection in which they are first created are bound to involve the solution of biological problems of prime importance to plant science.

I refer first to the splendid provision of Mr. John D. Rockefeller, Jr., for the landscaping and park planting of the Claremont Park site overlooking the Hudson, already the perhaps potential Acropolis of America, and ennobled as the site of Grant's Tomb, the Riverside Church, and the broadly conceived

International House. When announcement was made that Mr. Rockefeller would spend such large sums in the appropriate development and landscaping of this little plot, many may perhaps have gasped and wondered whether trees would grow in a so gold-plated soil. However, the massive recessed wall and other architectural accessories, the approaches, and the planting now going on all suggest new and higher standards beyond any hitherto recognized in American landscape art. The development of Fort Tryon Park at the north end of Manhattan Island is a larger and even more wonderful gift by Mr. Rockefeller to the city and it suggests that the growing of trees under city conditions, with the demand for the highest artistic perfections in their dispositions, is now in hands which will bring about solutions of problems of the utmost importance not alone to New York but to city and park planting the world over. That cities like Birmingham in England and St. Louis in this country have deliberately faced the necessity of growing their trees and other park material in the country and bringing them to their city parks when necessary as replacements shows at once the seriousness of the situation and the necessity that more ultimate solutions be reached.

Mr. Rockefeller's further very generous effort to broaden the national forest preserves in one of our far western states and the reception it met at the hands of certain political interests show also that there are still many Rubicons to be crossed.

There is much to indicate that values rather than prices, and more fundamental human interest than profits, whether gold or paper, are to dominate the further development of our civilization in the decades and centuries yet to come. The Morris Arboretum with all it means both to science and to art fitly symbolizes one of the major hopeful signs of the times. It is certainly of good omen that plant preserves of all types are being set aside all over our land, from the sparsely cactus-clad deserts of Arizona to the still nobly forested slopes of the Great Smokies, and from the mystic Everglades of Florida to the historic ground where General Washington crossed the Delaware.

The long period of subjugation and devastation of our friends the trees is past and from now on plant science and art have joined hands for the long pull toward rehabilitation, toward cherishing plant life for spiritual and artistic as well as more material

profits till man's aesthetic nature and his sense of beauty may assert their rightful place in regulating his relations with his life environment.

Whatever we may think of aristogenesis, there is still much to prove that man first became human under the shade and in the boughs of the protecting trees. They among plants as we among animals are both climax types with similar problems for survival in the long geologic look ahead. Both are threatened by the ravaging insects and the trees especially, not only by man's ruthlessness but by the more vulgar grasses and herbs that sap away the riches of the soil so much more rapidly than can the trees. Both alike show their manifest destiny to subdue the rock-bound earth and make it habitable, a source of food for plants which in turn provide the food and physical necessities for higher and still higher types of organized beings.

Such works of art as the Morris Arboretum typify a very high stage in man's relations with his physical environment, moving on from the simple kitchen and herb garden of the mediaeval monks toward the noblest types of expression of which man's artistic spirit is capable and for its adequate development and maintenance demanding the most intensive exertions of his intellect through the medium of modern experimental biological science. May it long be, as it is now, the happy abiding place of all forms and types of plant life from "the cedar of Lebanon to the hyssop that springeth out of the wall," and may it come more and more to express the perfect synthesis of plant science and landscape and gardening art.

ROBERT A. HARPER.

SEMI–AQUATIC CACTI

Cacti are usually rated as desert-plants or at least as xerophytic in character. Rarely, if ever, does the popular mind conceive of them as semi-aquatics. It is true very many terrestrial kinds abound and thrive in dry climates and deserts where water, both in the soil and in the air, is scant. Other terrestrial kinds thrive in the ordinary conditions of a temperate clime, while still others may be found in the humid tropics, some kinds anchored in the moist soil and bathed with moisture-laden, stagnant air; others in the tops of forest trees, whither their ancestors betook themselves, seeking a dry anchorage and a less humid, at least a circulating, atmosphere.

The ancestors of the present-day cacti evidently had a long and varied career among many kinds of environments. For the plants of various species that are now confined naturally to a peculiar habitat will also grow readily when transferred to a different type of soil and surroundings.

The morphology and physiology of cacti are very flexible. This fact makes the taxonomic study and interpretation of the species difficult in many cases. These flexibilities are very evident in the roots and the stems. The flowers and fruits, in our experience, are more stable. In many cases, the roots of a given species growing where water is readily and continuously available will be short and thick, resembling tubers or small sweet-potatoes; on the contrary, if water is scarce and a supply perhaps uncertain, the roots, instead of being tuber-like, will elongate to a remarkable extent. We have pulled them up from the dry sand in lengths varying from five to fifteen feet! Likewise, the stems are shortened or lengthened mainly by the availability of light (shown to some extent in the accompanying figures). This phase of flexibility is best revealed in the case of plants of the same species growing under different local conditions. For example, the plants growing in full sun, their normal or usual habitat, will have the relatively wide stem-joints one is accustomed to know. Should an associate plant, perhaps only a few feet distant, grow in some local shade condition, the stem-joints will most likely be greatly elongate as well as narrow.

This flexible character of the root-system and accommodating changes in the plant surface may be the chief reason why typically

desert cacti may be grown, with proper treatment, in a humid climate and vice versa.

These idiosyncracies of the cacti are well known to many cactus students. There is still another peculiar habit and habitat to the credit of this outstanding group of plants, however, which is very little known.

Along the coasts of Florida various species of prickly-pears (*Opuntia*) grow just back of the barrier ridge above high-tide. These plants are almost continuously in a salt-laden atmosphere, while their roots are in a soil somewhat saline from the salt locally deposited from the atmosphere. Other prickly-pears (*Opuntia*), prickly-apples (*Harrisia*), and barbed-wire cactus (*Acanthocereus*) grow on coastal flats, where spring tides and high water during storms run over them, yet they continue to flourish luxuriantly.

A saline habitat seems to make little if any changes in them, for plants of the same species growing continuously under saline influences and under non-saline show no marked differences. There is a case of a prickly-pear (*Opuntia polycarpa*) which grows on the coastal sands of northeastern Florida, appearing again in the heart of the peninsula, and finally on the coastal sands of the Cape Romano region on the southwestern coast. The regions are widely separated, the two extremes are saline, the median one is not at all saline, yet the plants of the three localities are alike. It is thus readily seen that cacti will thrive in saline habitats.

Our admiration for this versatile group of plants reached a climax when we found prickly-pears not only thoroughly at home in saline habitats, but found them thriving as semi-aquatics. The Cape Sable region of southern peninsular Florida offers many unique problems for the botanist. Ecologically and floristically considered, the region presents beaches, coastal hammocks, prairies, prairie-hammocks, red-mangrove swamps, black-mangrove swamps, button-mangrove swamps, white-mangrove swamps, high-hammocks, tidal lagoons, lakes, Everglades, Everglade hammocks, inlets, rivers, cypress swamps, Indian mounds, and kitchen-middens. Cacti representing several genera (*Opuntia, Harrisia, Acanthocereus*) occur in most of these plant associations. These cacti are both terrestrial and epiphytic. Those

FIGURE 1. In a red-mangrove swamp, submerged with salt water about six inches twice daily, on Chokoloskee Island, Florida. Plants of *Opuntia Dillenii* growing in shade are spindly and sparingly spiny.

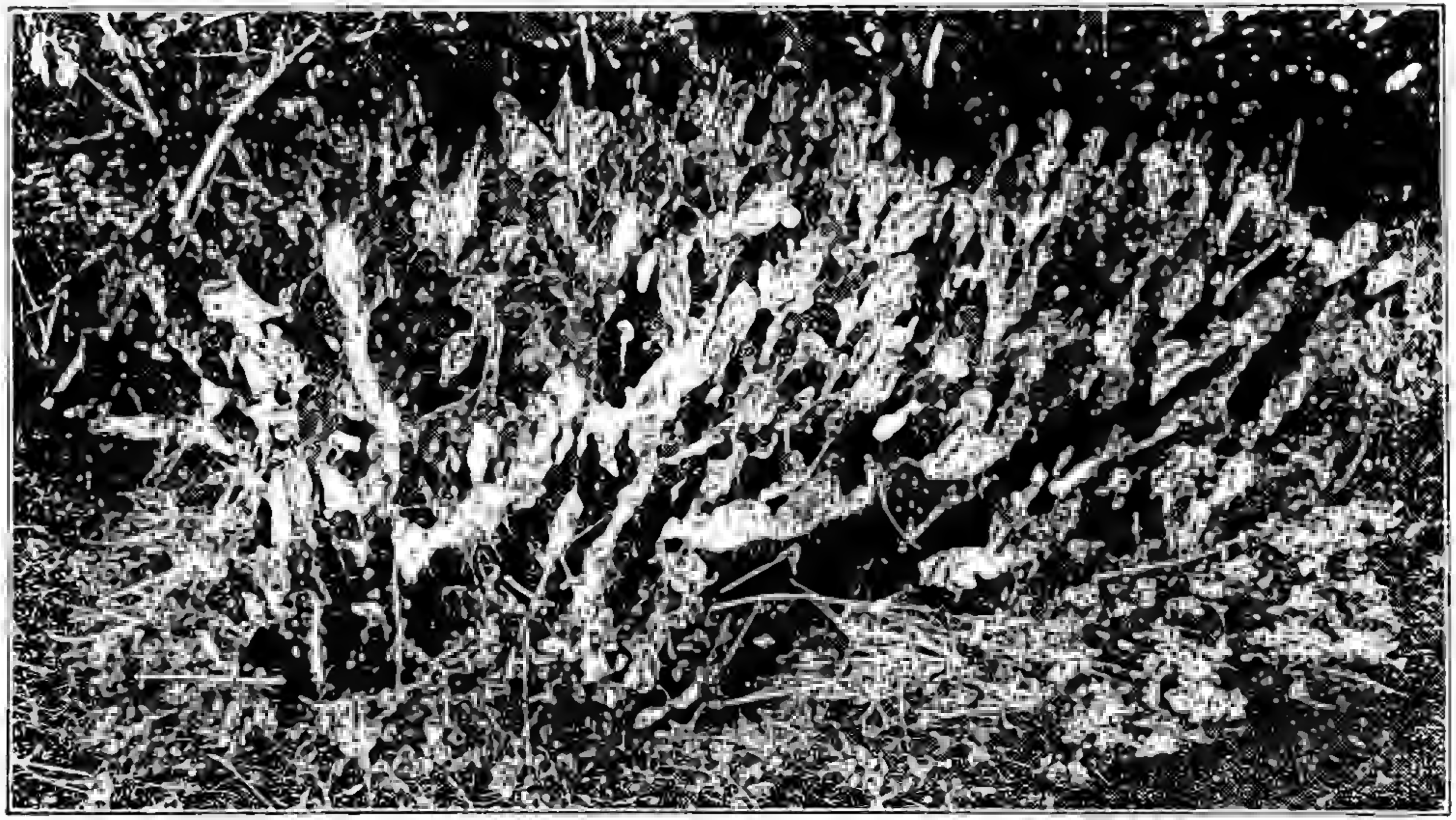

FIGURE 2. In a buttonwood swamp, submerged with salt water about six inches twice daily, on Chokoloskee Island, Florida. Plants of *Opuntia Dillenii* growing in open sun are dense and stocky as well as very spiny.

in wet places often take to the trees where they seem to be perfectly at home. However, some plants brave the condition of living with permanently "wet feet" and appear to be equally contented in the tidal swamps.

The cacti shown in the two accompanying figures are forms of the Florida representative of the tropical *Opuntia Dillenii.* FIGURE 1 shows a photograph taken in a red-mangrove (*Rhizophora*) swamp. The prickly-pear is growing among the prop-roots of the mangrove. The plant stands in about a half a foot of salt water at mean high tide and, of course, the soil is strongly saline at all times. In the red-mangrove swamp the roof is high and little light reaches the ground, hence the long narrow stem-joints which indicate that they reach for light. FIGURE 2 is from a photograph taken in a button-mangrove (*Conocarpus*) swamp. The prickly-pear is only a few feet from the open salt water. It stood in about six inches of tide when the picture was made. Twice daily it receives this salt-water bath and in storms may be more deeply submerged for long periods. The roof of the button-mangrove swamp is not so high as that of the red-mangrove, hence the stem-joints are not so elongate as those shown in FIGURE 1, and they are more normally armed. A very interesting point in FIGURE 2 is the angle at which the stems stand. Normally they should lean toward the light or away from the dark background of the buttonwoods; on the contrary, they may be seen to be leaning away from the light. There is nothing between the plant and the open water in front of it. The waves from the Gulf which beat upon the plant are sufficiently frequent and strong to keep it in this contrary-to-normal position.

JOHN K. SMALL.

PLANT FORMS IN ORNAMENT

As announced in previous numbers of this JOURNAL (May and July, 1933) there was opened on May 9 in Gallery D 6 of the Metropolitan Museum of Art a special exhibit planned to show, as far as possible, in association with the living plants themselves, designs in sculpture, textiles, embroideries, and other fields of art actually based on plant forms. This exhibit was planned to continue through the summer, to close on September 10. It was made

possible through the coöperation of members of the several departments of the Metropolitan Museum of Art, the Brooklyn Botanical Garden and The New York Botanical Garden, the latter institutions undertaking to supply the necessary living plants and provide for weekly inspections and necessary replacements.

It was realized at the beginning that to maintain attractive exhibits of living plants over a period of four months in a closed gallery various problems would arise. The ventilation, light, and humidity conditions of Gallery D 6, a high-ceilinged room with 4224 square feet of floor space, were not favorable to plant growth. To maintain an attractive flower show or an exhibit of living plants for a few days or for a week indoors is one thing, but to plan and maintain such an exhibit to extend over a period of four months brings into consideration a very different set of factors. Frequent replacements became necessary, as was to be expected. Because of rapid deterioration of certain types of plants, it became necessary to move most of these out of doors each evening after the gallery was closed. Naturally, greenhouse plants or those grown out of doors, when moved into an environment so radically different as that presented by Gallery D 6, would suffer and soon show deterioration and require replacements. This situation has been met as far as possible through a weekly inspection of the living plants by representatives of the gardening staffs of the Brooklyn and New York Gardens. Each week essential replacements have been made as far as possible and from time to time new plant species have been added to the exhibit as they came into flower. Each week-end the plant exhibits have been rehabilitated, cut flowers have been provided and sometimes ornamental plants not closely associated with the designs based on plants have been added for decorative effect. Through the summer's experience the officials and employees of all three coöperating institutions have gained valuable knowledge which will be used to advantage in connection with any future similar exhibit.

In connection with this major exhibit in Gallery D 6, which was the featured special exhibit of the Metropolitan Museum during the summer, a special exhibit of prints was set up in Gallery K 37–40. This exhibit was planned to show the early development of illustration, and the sources available to artists in pub-

lished works. Many of the older illustrated books in this exhibit were loaned to the Metropolitan Museum from the Library of The New York Botanical Garden.

During the summer special articles regarding the exhibit have appeared regularly in the Bulletin of the Metropolitan Museum of Art, prepared by staff members of that institution, by Dr. Gager, Director of the Brooklyn Botanic Garden, and by the undersigned. The exhibit has been an outstanding success, receiving much favorable comment, and has been an excellent example of coöperation between three city institutions, the objective being to set up and maintain over a period of four months a very specialized exhibit not only for the benefit of designers and artists themselves, but for the general public as well. The exhibit has been remarkably well received, the registered attendance in the two galleries up to August 13 being 86,131. By the time the exhibit closes on September 8 the attendance will have passed the 100,000 mark.

E. D. MERRILL.

PUBLIC LECTURES DURING SEPTEMBER, OCTOBER AND NOVEMBER

Following is the program of the free lectures given by The New York Botanical Garden on Saturday afternoons at 3:30, during the autumn months of 1933. They are delivered in the lecture hall of the Museum Building and are illustrated by lantern slides and otherwise. Doors are closed at 3:30; late-comers are admitted at 3:45; lectures close promptly at 4:30.

Sept. 9. "Some Unusual Trees and Shrubs," Mr. Henry Teuscher, Dendrologist.

Sept. 16. "Diseases of Lilies," Mr. Keith O'Leary, Boyce Thompson Institute for Plant Research.

Sept. 23. "Important Tropical Fruits," Dr. H. A. Gleason, Head Curator.

Sept. 30. "Dahlias," Dr. Marshall A. Howe, Assistant Director. (Exhibit of collection of living dahlias).

Oct. 7. "The Battle Between Molds and Man," Dr. B. O. Dodge, Plant Pathologist.

Oct. 14. "Autumn Coloration," Dr. A. B. Stout, Director of the Laboratories.
Oct. 21. "Bulbs in the Rock Garden," Mrs. Wheeler H. Peckham, Honorary Curator, Iris and Narcissus Collections.
Oct. 28. "Trees in Winter Garb," Dr. Forman T. McLean, Supervisor of Public Education.
Nov. 4. "The Autumn Berry Crop," Mr. E. J. Alexander, Assistant Curator and Curator of the Local Herbarium.
Nov. 11. "The Everglades of Florida," Mr. Harold N. Moldenke, The New York Botanical Garden.
Nov. 18. "Begonias and Their Cultivation," Mr. T. H. Everett, Horticulturist.
Nov. 25. "A Trip to Bermuda," by Fred J. Seaver, Curator.

A GLANCE AT CURRENT LITERATURE[1]

Desert Plant Life contains three articles in the August number of exceptional value to the cactus grower. They are "Moisture and Soil for the Succulent Rock Garden," by Roy M. Stevens, "Commercial Fertilizer," by T. C. Spruit, with a chart showing how to mix fertilizers and which combinations to avoid, and "Cacti I Have Met," by Peter Barnhart.

* * * *

Tulip mosaic, the oldest known plant virus disease, is treated historically by M. B. McKay and M. F. Warner in *The National Horticultural Magazine* for July. Among other interesting illustrated contributions to this issue is an article on "Forms of Pine" by Arthur D. Slavin. Many unusual plants are described in the last 20 pages.

* * * *

The August *Flower Grower* is an all-planting number, describing the treatment of plants that may or must be put in the ground in the fall. The magazine points out that prices of bulbs are low this year, and recommends using many of them. The issue also

[1] All publications mentioned here and many others—may be found in the library of The New York Botanical Garden, in the Museum Building.

contains material on peonies, tamarisk, iris, seedling delphiniums, and roses in the shade.

* * * *

Two highly decorative climbing shrubs, *Hydrangea petiolaris* and its relative *Schizophragma hydrangeoides,* are illustrated and described by Edgar Anderson in the Arnold Arboretum *Bulletin of Popular Information* for July 24. Both bloom in the spring, and are considered most attractive when allowed to climb up the trunk of a tree.

* * * *

Evergreens and other shrubs for rock gardens are treated in *Horticulture* for August 1. Descriptive tables give planting directions.

* * * *

"Botanical Notes from Yucatan" is the title of a comprehensive chapter by J. C. Bequaert in a 1933 publication of the Carnegie Institute of Washington, covering the medicine, biology, meteorology, and sociology of the Peninsula of Yucatan.

* * * *

Nature for July 8 reports an address by Sir Frederick Keeble entitled "The Nitrogen Hunger of the World," in which the effect of nitrogen on crop plants is explained. "Life depends on the resultant of two opposing forces," Sir Frederick is quoted as saying, "bacteria that fix nitrogen and those that liberate it or hoard it."

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

With the purpose of making more native American plants available for garden use, T. H. Everett, Horticulturist, and E. J. Alexander, Assistant Curator, accompanied by Stanley Pearson, apprentice gardener, all of The New York Botanical Garden, left New York August 23 for a two months' trip through the southern Appalachians, where they plan to collect seeds and roots to be tested in cultivation.

American plants, though so far little used except in European gardens, are highly prized by those who grow them. Yet seeds

of the few now in use have been only rarely available. Moreover, according to Mr. Alexander, there are approximately 200 species in the southern mountains and adjoining coastal plain which would make desirable additions to gardens, grounds, and greenhouses. So, on The New York Botanical Garden's expedition it is planned to gather seeds of all those that set seed in the early fall, and roots of as many others as possible.

Two dozen subscribers, each of whom will receive an allotment of the seeds and roots, are financing the trip. They include both individuals and nurseries in this country and abroad.

Each species found will also be thoroughly tested both outdoors and in greenhouses at the Botanical Garden, where information will be gathered from each coöperator as to the hardiness and requirements of the specimens in different localities.

Gardens the world over may be greatly enriched as a result of this expedition.

Dr. Albert C. Smith, Associate Curator, is sailing September 9 from San Francisco on his way to the Fiji Islands, where he will spend a year gathering plants. His collection is expected to bring many new plants to the attention of botanists. Traveling on a fellowship from the Bishop Museum in Honolulu, in coöperation with Yale University, Dr. Smith will stop for two weeks in Hawaii before proceeding to his goal. At the end of his year's leave of absence from The New York Botanical Garden, he will return here to work on the identification of his specimens.

Meteorology for July: The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 98° on the 1st; 94° on the 7th; 82° on the 10th and 11th; 95° on the 19th and the 23rd; *102° on the 31st.* The minimum temperatures recorded were: 54° on the 3rd; *52° on the 4th;* 56° on the 13th; 62° on the 18th and 63° on the 26th. The total precipitation for the month was 2.75 inches.

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GENERAL INFORMATION

Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than 1,500,000 specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 42,800 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestral subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
Annual Member	annual fee	10

Contributions to the Garden may be deducted from taxable incomes.

The following is an approved form of bequest:

I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ————.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

All requests for further information should be sent to

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NOTES, NEWS, AND COMMENT

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TREES AND SHRUBS OF THE ORIENT—III

THE HARDY BUDDLEJAS[1]

Few people who are the proud possessors of a "butterflybush" in their garden and who delight in the great attraction which the sweetly fragrant flowers of this shrub have for butterflies realize that botanists now recognize more than 70 species of this genus. However, the great majority of these species inhabit tropical regions of Asia, South America, and Africa, and since, consequently, they are not hardy with us out of doors, they shall not concern us in this article. About two thirds of all the known species of *Buddleja*—46 to be precise—are natives of Asia, and most of these again are to be found in the province of Yunnan, famous for the extraordinary wealth of its flora. But, tempting as this rich flora of Yunnan is to the explorer, it is exasperating to the western horticulturist who only too frequently finds it impossible to accommodate the beautiful Yunnan plants to our more rigorous climate.

Only seven or eight of the species of Buddleja which so far have been introduced into cultivation—all of them native of Asia—can be grown successfully out of doors in the vicinty of New York, and of these only two are really first-class ornamental flowering shrubs.

There may yet be some good varieties among those which so far are only known from herbaria, such as *B. myriantha* Diels and *B. heliophila* W. W. Smith, from northwestern Yunnan and Tibet; *B. nana* W. W. Smith, from Szechuan and Yunnan; *B. praecox*

[1] Named after the English botanist Buddle; also spelled *Buddleia, Buddlea,* or *Buddleya. Buddleja,* however, is the original spelling in Linné's Species Plantarum.

Lingelsheim, and *B. tibetica* W. W. Smith, from Tibet. All of these, judging from herbarium specimens and from collectors' notes, appear to be rather promising. But, whether any of them will be able to compare favorably with a good form of *B. Davidii,* the most commonly cultivated butterflybush, will yet have to be seen.

From a taxonomic standpoint the genus *Buddleja* presents considerable difficulties, and to the horticulturist trying to find his way through the maze of forms, it appears as though many of the supposed species would be better included as varieties in some other species. The distinction between closely related species is most frequently based on the length of the corolla tube, the position of the stamens in the tube, and the length of the calyx in comparison with the tube. The density and color of the tomentum on the leaves and inflorescence have also to be considered. None of these characteristics is very satisfactory or reliable. To increase the confusion, most Buddlejas hybridize easily in cultivation, and to raise any of them from seeds from a locality where more than one species is present is almost sure to result in a mixed hybrid offspring.

Certain species which are supposed to be in cultivation, such as *B. Fallowiana* and *B. stenostachya*—even in herbarium specimens almost indistinguishable to me—I have never been able to obtain, though many times I have received seeds under these names from various European botanical gardens. The plants which I raised from these seeds were always hybrids, more or less intermediate between *B. nivea* and *B. Davidii,* their hybrid origin being betrayed by the great variability of the seedling plants. Under the name *B. Forrestii* I have never received anything but *B. nivea*; at least, I have never been able to see any appreciable difference. I am inclined to believe that either *B. Forrestii* is only a local variant of *B. nivea* which loses its distinguishing characteristics in cultivation, or that most of the plants which are in cultivation in Europe under the name *B. Forrestii* are nothing but *B. nivea.*

Most hybrid Buddlejas which I have seen were inferior to the good forms of *B. Davidii.* The most promising seemed to me *B. nivea* × *B. Davidii.* The best form, of what I took for a second generation of this hybrid, I received under the name *B. macrostachya yunnanensis* (a name which was later transferred as variety to the species *B. nivea,* where it will be mentioned). It com-

bined the silvery-white tomentum of the leaves of *B. nivea* with the bright bluish-purple flowers and long spikes of *B. Davidii.* The location of the stamens in the tube and the size of the corolla varied in different plants; otherwise the seedling plants of this set looked fairly uniform.

The Hardiest Buddlejas

The hardiest species of *Buddleja* which are in cultivation are the following: *B. albiflora, B. alternifolia, B. Davidii, B. japonica, B. Lindleyana,* and *B. nivea;* leaving out *B. Fallowiana, B. Forrestii,* and *B. stenostachya,* which as yet I do not understand.

Buddleja japonica Hemsley and *B. Lindleyana* Fort. can be dispensed with as being of so little ornamental value that they need not be considered for garden planting. Both may be readily distinguished from all others by their sharply 4-angled and more or

FIGURE 1 Two closely related species of *Buddleja—B. albiflora* (above) with noticeably round twigs and pinkish-lilac (not white) flowers, and *B. nivea* (below), which is characterized by a silvery-white tomentum on its leaves and stems.

less winged twigs. In *B. japonica* the twigs are more strongly winged than in *B. Lindleyana*; the flower racemes of *B. japonica* are pendulous while those of *B. Lindleyana* are upright. The leaves of *B. Lindleyana* are ovate, shorter, and usually broader than those of *B. japonica*, which the accompanying photograph shows. *Buddleja Lindleyana*, a native of eastern China, is the prettier of the two, but it has proved rather tender in the northern parts of this country. In the southeastern United States it is quite frequently found naturalized. *B. japonica*, as the name implies, is a native of Japan. Occasionally it is cultivated under the wrongly applied name *B. curviflora*, and I have also received it under the name *B. Wilsonii*, to which it has no right whatever.

The hybrid between these two, *B. intermedia* Carrière, which first appeared in France as a chance seedling some 60 years ago, has never become widely known and is rare in cultivation. To judge from a colored engraving which Carrière gives in *Revue Horticole* (1873), the flowers in their shape and size suggest *B. Lindleyana*, while the foliage favors *B. japonica*. It seems to be prettier than either of its supposed parents by virtue of its long pendulous racemes of rather showy violet flowers, but as an ornamental shrub it will hardly be able to compete with *B. Davidii*. The late E. H. Wilson expressed the opinion that this might not be a hybrid at all but simply a good form of *B. japonica*, but Carrière's picture certainly suggests hybrid origin for this plant.

Another form of this hybrid which combines the erect spike of *Buddleja Lindleyana* with the strongly winged twigs of *B. japonica*, and is said to have rosy-violet flowers, has been recognized under the name *B. intermedia* var. *insignis*. I can not judge as to its merits, since I have never seen it.

Buddleja alternifolia Maxim is set apart from the rest of the hardy Buddlejas as the only one with alternate instead of opposite leaves. Three or four other species with alternate leaves have been described—all, by the way, native of Tibet and the borders of western China; so far, however, none of these have been introduced into cultivation.

Buddleja alternifolia seems to have been collected first by Piasezki some 55 years ago in the province of Kansu, China. In 1880 it was named and described by Maximowicz, but it was left to Reginald Farrer to introduce it into cultivation in 1914. Farrer gives the following glowing description of this beautiful shrub:

"A most lovely plant, exactly like a very delicate weeping willow, but that the drooping sprays are set all along with little clusters of purple blossoms, till the whole sweeping mass becomes a cascade of colour. It affects hot and precipitous banks of loess and stony ground, weeping from the sunbaked sand cliffs with incomparable effect. Will get 16 ft. tall and 15 ft. in diam. Succeeds equally well in calcareous and non-calcareous soil. It flowers in the second year's growth and stands little pruning. Once established it grows very rapidly and should be thinned to one or more sturdy main stems to give it height to show off its lovely arching sprays."

I have frequently heard complaints from plant lovers that *Buddleja alternifolia* did not flower satisfactorily in their gardens, but this failure could always be traced to too rich a soil. In poor, gravelly, well-drained soil in full sun this Buddleja will never disappoint. It is the hardiest species of the genus which I know; I have seen it pass unscathed through 20° below zero in northern Illinois.

There remain then the three rather closely related species, *B. albiflora, B. Davidii,* and *B. nivea,* all of which are shown in the accompanying photographs. *B. albiflora* Hemsley in particular is rather similar to *B. Davidii,* but it may be readily distinguished by its round twigs—those of *B. Davidii* are always more or less angular—and by its smaller flowers with the stamens inserted immediately below the mouth of the corolla instead of near the middle of the tube as with *B. Davidii.* Its flowers are usually of a rather poor pinkish-lilac, not white as proclaimed by Henry. The name "*albiflora*" (white-flowered) is a misnomer. This species was first discovered by A. Henry in the province of Hupeh, China, and was named and described by Hemsley in 1889. E. H. Wilson introduced it into cultivation in 1900 by sending seeds of it to the nursery of Veitch for whom he was collecting in China. *B. albiflora* has proved in gardens fully as hardy as *B. Davidii,* but it can never compare with it in beauty.

Buddleja nivea Duthie—also introduced into cultivation by E. H. Wilson and distributed by the nursery of Veitch—is distinguished by the silvery-white tomentum of its leaves and stems, which renders the plant as such rather pretty. Its flowers, unfortunately, are small and inconspicuous and they almost disappear under the white wool. Good forms of the hybrid *B. nivea* × *B. Davidii,* however, are well worth growing.

The variety *yunnanensis* Rehd. & Wils. of *B. nivea,* with larger flowers and spikes, looks rather promising in herbarium specimens collected in the wild, but what I have seen in cultivation under this name was always wrong. Besides, it seems to me that it could not be difficult to produce by judicious crossing a hybrid form which would be indistinguishable from the wild-collected *B. nivea yunnanensis,* and until farther proof—which could only be obtained in the type locality—I reserve some doubt as to the validity of the variety *yunnanensis*.

B. Davidii and its Varieties

Last but not least comes *Buddleja Davidii* Franchet, the commonly cultivated "butterflybush." I have always regretted that Hemsley's name "*Buddleja variabilis,*" under which this shrub first obtained popularity, had to be set aside for the two-years-older name, *B. Davidii.* This species, certainly, is extraordinarily variable, and the name "variabilis" seemed to be the most fitting it could bear.

Buddleja Davidii was discovered by A. Henry and came first into cultivation in the Botanical Garden of Leningrad, whence it passed to other botanical gardens of Europe. However, this first introduced form was a rather inferior one. In 1893 Vilmorin received from Père Soulie seeds of a Buddleja which proved to be a much better form of *B. Davidii.* It was later reintroduced by Wilson and distributed by Veitch under the name var. *Veitchiana.* Wilson also introduced the varieties *magnifica, typica,* and *Wilsonii.* The variety *Veitchiana* is the first of these to flower; the others flower in the succession in which they are named.

The varieties *magnifica* and *Wilsonii* are further distinguished by the reflexed margins of the corolla lobes. *Magnifica* has very dense spikes of large, deep rose purple flowers. The flowers of *Wilsonii* are smaller and rose-lilac, in very long, loose, and drooping spikes.

One of the finest of all the varieties of *Buddleja Davidii* is *superba*—also introduced by Wilson—which has very large spikes bearing the large flowers of *magnifica,* but without the reflexed corolla lobes.

Very pretty, also, is the variety *nanhoensis* which was introduced by Farrer. Of all the varieties of this species it is the small-

FIGURE 2. Three noteworthy varieties of *Buddleja Davidii: erecta* (left), the flowers of which are rose-purple; *nanhoensis* (upper right), smallest and most graceful of all, with short, narrow leaves and wiry twigs, and *amplissima* (lower), which bears long, full panicles of deep-lilac flowers.

est and most graceful, rarely growing over 5 or 6 feet tall. Its short, narrow leaves and the thin, wiry twigs which distinguish it are well brought out by the accompanying photograph. Its flower panicles are rather small and loose but are produced in extraordinary profusion and over a long period of time. Its flowers are of a very pleasing, clear bluish-lilac with a bright orange eye. This is the only Buddleja which I have found satisfactory also as a cut flower. If cut early in the morning the twigs last for several days, delighting with their sweet fragrance and grace. The heavy panicles of all other Buddlejas wilt very quickly in a vase.

Two newer varieties which are well worth noting are *amplissima* and *erecta,* brought out by the nursery of V. Lemoine at Nancy, France, and pictured here.

The very long panicles of medium-sized, deep lilac flowers make *amplissima* notable even beside the larger-flowered variety *superba*; the variety *erecta* with rose-purple flowers is distinguished by its inclination to produce some strictly upright spikes, like the one shown in the photograph. Not all of its spikes, however, are erect.

The two varieties, *pendula,* supposed to be of drooping habit with narrow leaves and mauve flowers, and *Ile de France,* with very long, purplish-blue racemes, both offered by V. Lemoine, are not known to me.

Buddleja Davidii produces its flowers on the end of the current year's growth, and, since naturally the largest panicles appear on the strongest shoots, it should be the object of its culture to induce the production of strong shoots by sharp pruning, accompanied by feeding of the plant in early spring. Its characteristic to flower on the current year's growth makes it possible to grow this shrub also in regions where its wood does not survive the winter. In such regions the plant may be cut down to the ground in the fall, after the first few heavy frosts, when a cover of straw or leaves should be applied. The plant usually flowers satisfactorily for quite a few years under this severe treatment.

The ability of *Buddleja Davidii* to spread from seeds and to make itself at home outside of its native country was demonstrated at the city of Verdun in France, where a year after the war a visitor observed this shrub in great abundance all over the ruins of the city. The hand of nature covered the destruction of man with new and strange beauty. The people who lived in the vicinity and who did not know this pretty shrub called it "la fleur des ruines" (the flower of the ruins), according to a report in *Revue Horticole* in 1919.

The Most Beautiful Buddleja

Mention has yet to be made of what is unquestionably the most beautiful species of the genus, *Buddleja Colvilei* Hook f. & Thom. Sir Joseph Hooker, who discovered this plant in 1849, even calls it "the handsomest of all Himalayan shrubs." The individual flowers of this species are more than an inch in diameter—much larger than the flowers of any other Buddleja. They are rose-pink to rose-purple with white throat and are produced in pendulous panicles, 12 to 18 inches in length. In its native habitat (at 10,000 to

FIGURE 3. *Buddleja japonica* has sharply four-angled twigs quite prominently winged, and pendulous racemes of flowers.

12,000 feet elevation) *B. Colvilei* attains the size of a small tree, up to 30 feet in height and as far through, and Sir Joseph remarks that "it is impossible to exaggerate its beauty, as seen in the borders of a Sikkim forest, covered with pendulous masses of rose-purple or crimson flowers, relieved by the dark green foliage."

In the western parts of England and in Ireland this Buddleja has been grown and flowered successfully; in the nurseries of Veitch, at Exeter, England, it has been reported to have withstood without damage 20° of frost. That in spite of all the high praise which it has received it has never become popular and is still hardly known outside of England, is rather surprising. Certainly, there should be sections in the United States where this beautiful shrub could be wintered in the open without cover. Yet, to my knowledge, it has never been tested in this country. I believe that even in sheltered parts of Long Island this Buddleja could be grown successfully, if planted against a south wall and given a light covering in winter. Since it requires three to four years of growth before it flowers, it should not receive any pruning beyond the removal of dead wood.

Buddleja globosa Hope, with bright yellow flowers in globular, axillary heads, should be of about the same hardiness or tenderness as *B. Colvilei*; but, since it is native to South America, it does not come under the scope of this article.

HENRY TEUSCHER.

SHADE TREE CONFERENCE AT NEW YORK BOTANICAL GARDEN

Nearly 200 men gathered September 7 and 8 at The New York Botanical Garden to attend the Ninth Annual Shade Tree Conference, for which the Garden acted as host. The Museum Building was given over to the delegates for those two days, with educational displays occupying a large part of the first floor, besides an exhibit of books relating to shade trees in the Library, and addresses being delivered in the Lecture Hall downstairs.

The third day of the meeting was spent in New Jersey, where Curtis May directed the delegates on a tour through the region showing devastation by the Dutch elm-disease.

Control of this newly introduced fungus pest, *Ceratostomella Ulmi,* or, as it is more popularly known from its conidial stage, *Graphium Ulmi,* was the leading note of the conference, during which a special session was held by directors of experiment stations in the northeastern states to agree on coöperative action in eradication of the disease.

R. Kent Beattie, Principal Pathologist in the Bureau of Plant Industry of the United States Department of Agriculture, and Dr. R. P White, Research Specialist in diseases of ornamentals at the New Jersey Agricultural Experiment Station, told of the source and progress of the new-found disease in the United States. Among the exhibits were charts and pictures elucidating the story.

While the Dutch elm-disease commanded much attention at the conference, other pests and problems of shade trees were given their due. After the address of welcome by Dr. E. D. Merrill, to which Chairman J. S. Houser, of Ohio, replied, E. P. Felt, Director of the Bartlett Tree Research Laboratories, spoke on general shade tree problems. H. W. Merkel, General Superintendent

of the Westchester County Parks, described trees of that famous park system and problems concerning them.

After luncheon, which was served in the Museum Building, Dr. H. A. Gleason, Head Curator at the Botanical Garden, explained the use of scientific names for trees and listed three advantages which they possess.

"First, they permit you to express your thoughts to students of plants in every country," he said; "second, they enable you to specify a particular kind of plant with far greater accuracy than is possible with an English name; and third, the name itself tells you something about the plant, such as *Acer*, the ancient Latin name for the maple tree; *Acer saccharum*, the sugar maple, and *Acer rubrum*, the red maple.

"If two people are going to talk together on any subject," he declared, "they must have names for things; they must get together in a language that both can appreciate. The advantage of Latin is that it is a dead language. New Latin terms can be introduced into scientific language without interfering with the spoken language of any country."

One million dollars for each 200 acres is no more than an adequate endowment for an arboretum, Henry Teuscher, Dendrologist at The New York Botanical Garden, said in an address on "The Planning of an Arboretum." For general scientific research, which should be the aim of every large arboretum deserving the name, he recommended 1,000 acres, which, he said, might be managed on an initial endowment of four million dollars. He emphasized the need for provision of funds for carrying out experiments which must necessarily outlast the lifetime of the benefactor.

"There can be no doubt about the great need for arboreta in this country," he said. "Our timber resources are sadly depleted, and there is pressing need for information on rate of growth, soil requirements, age at maturity, timber quality under various conditions, and other problems, relating to both native and foreign trees which may be considered for reforestation in this country.

"There is need for the testing of trees for their hardiness and usefulness, for their disease resistance, and for the possibility of improving their hardiness, habit, beauty, resistance, etc., by selective breeding and hybridization. Trees need also to be studied further from a taxonomic viewpoint."

Professor Hugh Findlay, landscape architect, who spoke on "Advancing the Profession"; S. N. Baxter, who gave an illustrated lecture on "Notable Trees and Old Arboreta in and around Philadelphia"; A. E. Hitchcock, who presented results of a study by William Crocker, P. W. Zimmerman, and himself at the Boyce Thompson Institute on "The Effects of Gas on Shade Trees," and Donald Wyman, of Cornell University, who reported on "Growth Experiments with Shade Trees," were other speakers of the afternoon. Dr. Forman T. McLean, who briefly described the professional school for gardeners being conducted by The New York Botanical Garden, guided the delegates around the arboretum at the Botanical Garden at the close of the afternoon session.

Speaking in the evening on "Eastern Asia as a Source of Trees and Shrubs," Dr. Merrill emphasized the desirability of further American exploration in eastern Asia for the enrichment of American horticulture.

"Eastern Asia and eastern North America have climates so nearly alike and possess so many closely related plants," he stated, "that plants brought from one of these regions to the other are more likely to thrive than those taken from other parts of the world. Another advantage of our seeking new horticultural specimens in eastern Asia is that in China alone, at least 18,000 species of plants are recognized. The flora there is the richest of any country in the north temperate zone, and many of these plants would be valuable additions to eastern American gardens. Moreover, some of them are likely to be resistant to diseases attacking native American plants.

"So far, Europe has taken the lead in exploring Asia. It is time that America followed its example by sending out such men as Reginald Farrer, Kingdon Ward, George Forrest, and E. H. Wilson (who did collect later for the Arnold Arboretum). There is need also for American botanists to adopt a more horticultural point of view. Great garden wealth is in store for this country when it sends men to Asia to bring back new trees, shrubs, and garden flowers."

Dr. A. B. Stout, who followed Dr. Merrill with an address on "Autumn Coloration," explained the chemistry and physiology of the reds, purples, yellows, and browns which replace the green of the leaves in autumn. New York, he pointed out, lies in one of the

three principal regions of the world which are blessed by the beauty of red leaves in the fall. The major part of the earth—that is, all except eastern North America, western Europe, and eastern Asia, with one tiny spot in southern South America—knows no such change of color.

Dr. B. O. Dodge, Plant Pathologist, speaking the following day on "Various Types of Trunk Invasion of Cedars and Junipers by Mycelia of Gymnosporangia," told the story of the lack of coöperation between growers of apples and growers of cedar trees, whose products are alternate hosts for the Gymnosporangium rust fungi, which damage apple trees and their relatives and also injure cedars.

He is looking forward, he said, to the time when a man can grow apples in his back yard and cedars out in front without material damage from Gymnosporangium on either host. Given an extra ten-year lease on life, he predicted he could make this come to pass, probably through the breeding or selecting of resistant strains of cedar.

"To try to control the rust by spraying infected cedars," he remarked, "would require almost daily applications from July until the following March, and this would be obviously impractical."

In a discussion which followed this address, Dr. H. H. Whetzel, of Cornell, said that the rust *could* be controlled on apple trees if spraying were judiciously applied at exactly the right time. "But," he added, "don't ask me when the right time is."

Many of our common mushrooms are being found more and more to be indispensable to the nourishment of the higher plants, through the formation of mycorrhiza, or fungus-roots, Dr. Fred J. Seaver, Curator at the Garden, said in a lecture on "The Fungi and Some of Their Economic Aspects." He showed photographs of some of the mushrooms which have lately been discovered to live in a symbiotic, or mutually coöperative, relation with the roots of trees. The mycelia, which correspond to roots among the fungi, absorb from the soil and pass on to the trees certain elements of nourishment which the roots of the trees alone could not obtain. At the same time, they gather nourishment for themselves from the tree roots around which they twine.

Other speakers of the day were William Middleton, who reviewed the shade-tree insect condition in the United States during

1932 and also presented a paper by H. E. Burke on "Shade-Tree Insects in California"; A. F. Burgess, who spoke on "Recent Developments in the Gypsy Moth Problem"; H. E. Peirson, Maine State Entomologist, on "Some Shade-Tree Problems in Maine"; C. C. Hamilton, "The Control of Borers"; W. E. Britton, "Injury to Trees by Squirrels"; T. J. Parr, "Practical Control Work on European Pine Shoot Moth and the White Pine Weevil in C. C. C. Camps," and W. H. Rankin on "Wound Gums."

Delegates gathered at the Hotel Montclair for an informal dinner addressed by their retiring chairman, J. S. Houser, the evening of September 8. Those in charge of the conference, besides Mr. Houser, included William Middleton, vice-chairman, of Washington, D. C.; R. P. Marshall, Yale University; R. D. Lowden, Needham, Mass., and H. Vaughn-Eames, Newark, N. J., in addition to Norman Armstrong, White Plains, N. Y.; E. P. Felt, Stamford, Conn., and Forman T. McLean, New York Botanical Garden, on the local committee on arrangements.

The Saturday afternoon lecture at the Botanical Garden, "Some Unusual Trees and Shrubs," by Henry Teuscher, was especially arranged because of the Shade Tree Conference.

CAROL H. WOODWARD.

SURVEYING FOR DUTCH ELM DISEASE

With the establishment of headquarters at The New York Botanical Garden for Paul V. Mook, of the Division of Forest Pathology in the United States Department of Agriculture, a preliminary survey was begun in September to locate elm trees in Westchester County and surrounding territory suspected of infection with the Dutch elm-disease. Mr. Mook is being assisted by Frank Ciofreddi, tree surgeon, and Dr. Pascal Pirone, who are temporarily connected with the Department of Agriculture. Working on Long Island, with headquarters at Westbury, is Harvey L. Price, Jr.

The survey will eventually extend as far north as Poughkeepsie, but it is doubtful whether, with the remaining brief season, work can be pursued further than Westchester County. Meanwhile, forces are also traveling through Connecticut and Massachusetts, where Mr. Mook did some investigating before coming here. He

has also made an initial survey of trees in the park systems of New York City, but declares that because of the many other infestations showing at this season, it is very difficult to detect the presence of any particular disease.

The autumn work in Westchester County, in which he is being aided by a representative of the county park system, will be followed next spring by a thorough investigation of suspected regions. For the present, trees seen with the naked eye or with field glasses from the roadways are the only ones being studied, unless private owners of property request an investigation. Sample twigs are taken from suspected trees and are sent to the laboratory at Wooster, Ohio, where the Dutch elm-disease was first studied in this country, following a minor outbreak several years ago in the vicinity of Cleveland. Cultures are then made, and, if a tree is found to be infected with *Graphium Ulmi,* the result is telegraphed to the local headquarters.

Burning of all parts of infected trees is the method of control recommended by R. Kent Beattie, of the Department of Agriculture, who is taking a leading part in the efforts to eradicate the disease. "Sometimes a tree can be saved by cutting off merely the branch which first shows the infection," he said, "but more often we have found that the fungus cropped out immediately in other parts of the tree, so that the whole finally had to be cut and burned."

During the Shade Tree Conference which took place at The New York Botanical Garden last month, Mr. Beattie told how he had discovered the source of the Dutch elm-disease in this country to lie in elm logs imported from Europe to be cut into fancy veneer. Larvae and adults of two species of the elm-bark beetle *Scolytus*, living underneath the bark, were found to be carrying the disease, which already has affected a great many trees in Europe. These insects escape very rapidly from the logs as soon as they are landed, and are evidently quick to spread the dreaded fungus disease on living trees.

Efforts are being made by the plant-quarantine administration to locate every factory importing logs which might thus carry the Dutch elm-disease, and scouts working to locate infected trees are being apprised of the location of such factories.

While the disease is not "spreading like wildfire," as some reports tend to indicate, its increase is rapid enough to warrant immediate and widespread preventive measures, in the opinion of Department of Agriculture representatives. About ten trees have lately been found in New York State—seven on Staten Island; one in Brooklyn, one at Lynbrook, and one at Port Washington on Long Island; and one each at Rye and White Plains in Westchester County, Mr. Beattie reports.

"In New Jersey, the number of authenticated Dutch elm-disease infected trees has increased from 69 to 309 since July 31," says Mr. Beattie. All are located in a 15-mile strip west of the Hudson River and New York Harbor, extending from Paterson to New Brunswick, N. J. Altogether 320 infected trees have been found in the general vicinity of New York City.

"Everyone, everywhere, is therefore urged to watch his elms for wilting or yellow or brown leaves accompanied by brown streaks in the young wood," Mr. Beattie urges. "When this combination is found, send pieces of the infected twigs as big as a lead pencil to the Dutch Elm-Disease Laboratory, care Experiment Station, Wooster, Ohio; or communicate with the Dutch Elm-Disease Office, care Shade Tree Commission, City Hall, East Orange, New Jersey, telephone Orange 3–4100.

"Not all sick elms have the Dutch elm-disease. Specimens must be cultured to determine the cause of the malady."

United States Department of Agriculture Circular 170-C, entitled "The Dutch Elm-Disease," gives detailed information in regard to this disease.

CAROL H. WOODWARD.

ASIATIC IMMIGRANTS IN THE BOTANICAL GARDEN—IV

Some of our Asiatic immigrants belong to widely distributed genera and have close relatives in North America. Others have no close relatives here, at least in the present geologic period, and may even contribute new groups of plants to our flora. Once established here, some of these immigrants make themselves perfectly at home.

Asia, perhaps to a greater extent than any other continent, has shown the close interrelationship between man and plants. This early contact has been manifested in a number of different phases. In very early prehistoric times, man in his dependence on plants was a *necessarian*. Later prehistoric man successfully undertook the domestication of wild plants as an *epicure* or an *aesthetic*. Still later the *ecclesiastic* appropriated plants to help develop his symbolism. In later prehistoric times the plant *financier* evidently came upon the scene, for commerce in plants was an early development. We are safe in assuming that one human category in its relation to plants did not develop until historic times, that is the *scientific botanist*.

As a result of aboriginal man's selections of useful plants and the scientific botanist's later activities, Asia has been the definite source of many of our present-day necessities and the luxuries of the vegetable kingdom. The two plant subjects considered below relate chiefly to the *aesthetic* and to the *financier*.

In 1897 *Schizonotus sorbifolius*, popularly known as false-spiraea, was introduced into the Botanical Garden. The presence of this plant brings to mind interesting personal reactions in the field of taxonomy.

The genus *Spiraea* of the "ancients" was a very comprehensive and complex assemblage of plants, both woody and herbaceous. Even the "ancients"—those of the Linnaean period and later—began to lop off species or groups of species from the *Spiraea* reservoir. *Opulaster, Aruncus, Porteranthus, Ulmaria, Sibiraea,* and *Schizonotus,* divisions of the original genus, are now recognized as genera by thoughtful and studious botanists. The same condition applies to many others of the original Linnaean genera, well-known examples among them being *Cactus, Laurus, Euphorbia,* and *Mimosa*. These and many others have, in early post-Linnaean days, been divided into several or many now almost universally accepted genera.

However, should a complex generic concept of the "ancients" that escaped the dividing process up to the present botanical period be separated into groups of the generic category, both the segregates and the botanical surgeon would stand a good chance of being anathema to some. Yet curiously enough, these botanical "fundamentalists" approve the segregation from the Linnaean

genus *Pinus* of the genera *Larix, Abies, Picea, Tsuga,* and *Cedrus,* without the least qualm of conscience. Had Linnaeus' *Pinus* remained intact up to the year 1900, one can only conjecture how its segregation into genera would have been received by certain taxonomists!

The false-spirea has had no outstanding history such as some of our other Asiatic immigrants have. It is a native of northern Asia, its range extending from the Ural mountains to Japan. Thus, naturally, it is hardy in the eastern United States. Clumps four to six feet tall are conspicuous by the plumes of white flowers and among our native plants its pinnately compound leaves may well attract attention. In the Garden area the false-spirea has escaped mainly to the edges of woods. In the Eastern States it has appropriated habitats such as roadsides, edges of woods, and open woods themselves. When established in new localities by the scattering of its seeds, the resulting plants can easily care for their maintenance through the development of suckers.

In 1908 *Lonicera bella* (*L. Morrowii* × *L. tatarica*) was introduced into the Garden plantations. The genus *Lonicera* in the sense of the herbalists and pioneer botanists was an assemblage of shrubs and woody vines separable into a number of groups by characters in the inflorescence. Some of these groups are by some present-day botanists considered as generic. Some of these generic segregates made before the end of the eighteenth century have been generally maintained by taxonomists, while others proposed at later dates have not had so lasting a hold in our floras.

This bush-honeysuckle may be considered a native of Asia, although it is really of garden origin, being a hybrid between two Asiatic species, *Lonicera Morrowii* of Japan and *L. tatarica,* a native of southeastern Russia and Siberia. The latter species was first found in Tartary, whence the specific name. It is an ornamental shrub, either in flower or in fruit.

There are many horticultural varieties, some of them emphasizing the characters of the first parent, others of the second, in which the flowers vary from white to pink, red, or crimson. The fruits develop into shades of yellow or of red. As a result of the attraction of the bright-colored fruits, the birds have planted this shrub in the woods both along the Bronx River and on the ridges nearby.

JOHN K. SMALL.

POISON IVY

In the August, 1933, number of the JOURNAL OF THE NEW YORK BOTANICAL GARDEN, a note on page 181 quotes as follows: "The efficacy of jewel-weed as an antidote for ivy-poisoning is disproved in the May June issue of *Torreya* by Ralph C. Benedict, who performed an experiment on himself. The jewel-weed aggravated the poison, he said."

Very much the same thing might be said of nearly two hundred of the remedies for ivy-poisoning listed by Professor James B. McNair in his book entitled "Rhus Dermatitis," and he suggests that the best remedy is the acquirement of knowledge relating to the looks of plants belonging to the sumac family. Even this might not always suffice when lovers go out at night and in the moonlight seat themselves in a bower of poison ivy for an hour of Browning quotations!

A good remedy for anything may be useless or harmful if employed in the wrong way. The old mountaineer in the Smokies said that "whiskey for snake bite ain't no good unless you use it in the right way and the right way is allers to have it in you when you're bit!"

Homo sapiens, who grasped an opportunity for naming itself that, has a panacea mind for one of its distinctions. It looks for something simple to put on for the cure of ivy poison, war, financial distress, and sin!

Returning to the jewel-weed question, the juice of this plant will "cure like a charm" in some cases of ivy poisoning. This I came to know in the course of fifty years as a physician. In other cases it may aggravate the trouble—like other poison ivy cures. We are dealing with one of the most profound questions belonging to modern medicine, *i.e.*, sensitization to poisons and the personal physiological defense mechanism which an individual may bring to bear against any given poison or sensitizing agent.

The large drug houses put out poison-ivy remedies which are sold throughout North America. These remedies vary so much in character, while any one of them is supposed to suffice for its purpose, that I wrote to a number of firms asking for their reports from correspondents. The general answer was to the effect that their "remedy had enthusiastic supporters among people who had failed to obtain relief from other preparations."

Doubtless they stated the truth. As a physician I would say that the best remedy put out by any one drug house has a descriptive circular going with the "cure" which contains details about the stages of the illness. An application which may be highly effective in one stage of ivy poisoning may aggravate the trouble in the other two stages.

The only remedy that I know about which is helpful in all three stages of ivy poisoning is a powdering of the affected region with thymol iodide and then brushing melted paraffin over the powder. Even that simple procedure should be under the eye of a physician.

A warning must be given against the employment of antidotes which are given by mouth or hypodermatically until we have an official report upon each one coming from the Council on Pharmacy and Chemistry of the American Medical Association. Even that high authority is not as yet prepared to make a report upon the danger to the kidneys which may follow the employment of any kind of internal remedy for ivy poisoning. The opportunity is open for some one to gain fame for original research along that line of inquiry. Professor McNair quotes authorities who explain that the epithelium of the kidneys has the same selective affinity for ivy poison that is shown by epithelium of the skin. When the skin is involved the patient knows about it, but when the kidneys are involved it is only the doctor who can know about it. When any sort of internal remedy is employed for cases of ivy poisoning the doctor must make frequent examination of the output from the kidneys.

How are we to dispose of poisonous members of the sumac family in situations where that would be desirable? It is a very simple matter, but we should first give thought to the real need for destroying the plants. The climbing species are decorative and several species give us the most gorgeous of autumn colors. Beauty is not to be discarded lightly in any of its phases.

The seeds of poisonous sumacs furnish excellent winter provender for many kinds of birds when snow is deep and winds are whistling.

Leaves of the climbing and low-growing species remain green when many other kinds of foliage are brown in times of droughts. Livestock animals of the farm as well as deer are grateful for this excellent browse, which seems not to harm them. In fact, we see

horses and cattle greedily eating the leaves when green grass is abundant.

If poisonous species of the genus must be disposed of in back-yards the vines may be pulled up by some one who is immune to the poison, or else the hands and arms of any one may be made temporarily immune by washing them in any one of several solutions of astringent iron salts and allowing the solution to dry. This plan was advocated by McNair. The best method of all is a dusting of the leaves with calcium chlorate when dew will catch and hold the powder. Or, later in the day plants may be sprayed with water and the calcium salt powdered over them—preferably at a time when the sun is shining. For one or two days subsequently the plants may not appear to be dying, but a week later they will be found dead—roots and all.

In this connection two warnings must be given. One relates to the story of the young lady who sprinkled all of her flower beds with weed killer. The other warning relates to a preference for calcium chlorate in its powdered form, because when employed in solution one may inadvertently back into the colorless solution and get it upon the clothing. Such clothing when dry and exposed to the sun may undergo spontaneous combustion. We occasionally hear of an accident to a farmer from premature explosion of his overalls!

Calcium chlorate may be purchased at seed stores in perforated sifter boxes under various trade names which make it rather expensive. A drum of fifty pounds weight bought from manufacturers costs less than ten dollars at the factory. Neighbors are grateful for gifts of this material. Powder sprinklers may be improvised from flour sifters.

ROBERT T. MORRIS, M.D.

WILLARD G. BIXBY

Willard G. Bixby, Secretary of the Northern Nut Growers' Association, which was organized at The New York Botanical Garden with Dr. N. L. Britton as sponsor, died at his home in Baldwin, Long Island, on August 16, 1933.

Mr. Bixby was in his 65th year. Upon retirement from business he devoted his time and attention to experimental propagation and cultivation of nut trees and shrubs. Approximately one thousand kinds, including species and varieties, were collected from various parts of the world and grown upon his Long Island estate. Experiments in hybridizing and in grafting have been recorded in his writings for many periodicals, and new methods for propagating plants of the nut-tree group were under way at the time of his death. Incidentally, he had recently become interested in the propagation of trees with so-called figured wood and this included some species that were not among the nut-bearers.

Mr. Bixby was a graduate of the Massachusetts Institute of Technology in 1889 and later made special studies in chemistry at other institutions. Because of a training in science and a natural bent toward accuracy in observation, his specimens, notes, and correspondence have unique value. It will be a misfortune for botany and for horticulture if his plantation and records cannot be kept together by some institution which will carry on his incompleted work, the foundation for which is substantial to a degree which rarely occurs. Any inquiry along this line should be directed to Mrs. Willard G. Bixby, Baldwin, Long Island, New York.

ROBERT T. MORRIS, M.D.

"GARDENING WITH HERBS"*

Well known as an amateur gardener and writer on horticultural topics, the name of the author of this book will in itself go far to insure its being widely read and appreciated. It is a clearly printed volume bound in a cloth jacket of flowery design and includes a useful bibliography and complete index. The twelve full-page artistic illustrations are executed in old style in keeping with the subject-matter but have little value for purposes of identification.

In the beginning the author tells of her determination actually to grow and know each plant to be described before writing her

*Fox, Helen Morgenthau. Gardening with herbs for flavor and fragrance. Pp. 1–334. The Macmillan Company, New York. $3.50.

book and of her efforts to secure the necessary material. Later follow chapters on literature, on herbs in the United States, their uses in the garden, and herb teas. Sixty-eight medicinal and officinal plants are then dealt with in detail, including their description, history and legend, uses and culture. The last chapter in the book, devoted to cooking with herbs, contains much useful information and suggestions for innumerable experiments. Recipes are given for a variety of concoctions ranging from mint julep to rose-petal jam. Insofar as this reviewer can judge, the recipe for the first-named is excellent.

T. H. Everett.

NOTES, NEWS, AND COMMENT

Seeds of nearly 100 species of plants from the southern Appalachians had been sent back to the Botanical Garden by the first week in September by E. J. Alexander and T. H. Everett who, accompanied by Stanley Pearson, student gardener, are exploring the region for new plants for garden use. Among the seeds which they feel give greatest promise for garden plants are *Oenothera argillicola, Campanula americana,* and *Vaccinium erythrocarpum,* the last of which was figured in *Addisonia* for December, 1932.

Considerable living material has also been shipped to the Garden from their expedition. Henry Teuscher, Dendrologist, is now working on propagation of what is evidently a fall-flowering variety of *Cercis canadensis,* the red-bud.

Continued storms have hampered the collectors somewhat in their travels, but with occasional changes of route they have been able to continue their exploration satisfactorily.

Harold N. Moldenke, who for several years has been a registered student at the Garden, has been appointed assistant curator for the period of one year, during the absence of Dr. Albert C Smith in Fiji.

The following visiting botanists have enrolled in the library during the summer: Dr. Edgar Anderson, Jamaica Plain, Mass.; Prof. H. H. Whetzel, Ithaca, N. Y.; Miss Mary F. Barrett, Bloomfield, N. J.; Prof. Frank D. Kern, Pennsylvania State College; Prof. Edgar T. Wherry, Philadelphia, Pa.; Dr. Louise Sud-

bury France, Baltimore, Md.; Dr. Walter T. Swingle, Mr. H. N. Wheeler, Mr. E. P. Killip, and Mr. L. S. Gill, Washington, D. C.; Miss Lily M. Perry, Athens, Ga.; Dr. J. M. Greenman, and Dr. Robert E. Woodson, Jr., St. Louis, Mo.; Dr. A. S. Foster, Norman, Okla.; Prof. John S. Burd, Berkeley, Calif.; Dr. J. V. Harvey, San Bernardino, Calif.; Dr. C. D. Howe, Toronto, Can.; Mr. J. A. B. Nolla, San Juan, Puerto Rico; and Dr. C. Skottsberg, Gothenburg, Sweden.

When Dr. H. H. Whetzel, of Cornell University, was lecturing before the Brooklyn Academy of Arts and Sciences in April, he invited Dr. Fred Jay Seaver, Mycologist at The New York Botanical Garden, to attend. "What is your subject?" Dr. Seaver asked him when the two scientists met at a downtown hotel. "Sneezing cups," replied the visitor.

"And what are they?"

"The group of fungi you've been working on for 25 years," said Dr. Whetzel.

"But, I never heard them called by that name," rejoined Dr. Seaver.

"Neither did I, until a reporter came to interview me one day," said the other. "I was trying to explain to him how the spores were ejected, and when I said it was just as though they were sneezed out, the man said, 'Wait a minute—I've got a name for the things: Sneezing cups!'"

The newspaper article was syndicated through the country, and now the cup fungi, known to scientists as Operculates, have the new name of "sneezing-cups" firmly attached to them.

Meteorology for *August:* The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 90° on the 8th; 89° on the 16th; *96° on the 26th;* and 86° on the 28th. The minimum temperatures recorded for each week or part of a week were: 60° on the 5th; 59° on the 11th; 56° on the 15th; 63° on the 22nd; and *54° on the 30th.* The total amount of precipitation for the month was 10.02 inches. It may be noted that this is the most rainfall recorded at The New York Botanical Garden for any month since July, 1901, when 11.76 inches was recorded.

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Vol. VII. Includes New Myxophyceae from Porto Rico, by N. L. Gardner; The Flower Behavior of Avocados, by A. B. Stout; Descriptions of New Genera and Species of Plants Collected on the Mulford Biological Exploration of the Amazon Valley, 1921–1922, by H. H. Rusby; and The Flora of the Saint Eugene Silts, Kootenay Valley, British Columbia, by Arthur Hollick. viii + 464 pp., with 47 plates, 10 charts, and 11 text-figures. 1927.

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JOURNAL
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THE ORANGE-RUST OF HAWTHORN AND QUINCE INVADES THE TRUNK OF RED CEDAR[1]

Some of our hawthorns are highly desirable for their beauty of blossoms and fruits, yet they may be very susceptible to the rust parasite, *Gymnosporangium germinale*. This fungus completes its life cycle on the red cedar. From here, the complaint is, it may go over to a favorite apple variety, where it renders much good fruit unsalable, just as it mars the beauty of the hawthorn. Our Cornell pathologists tell us that it does more damage to the fruit of certain varieties of apples than either of the two "cedar-apple" rusts. It is also called the "quince rust," because it likewise infects this fruit seriously.

The alternate host, the red cedar, on the other hand, is not usually badly damaged by the perennial stage of the fungus. Cedars infected during late summer and autumn show the rust the next spring in the axis of the younger leaves. After the spores have germinated, the mycelium grows down into the cortex of the branch, where it becomes perennial, unless the branch dies from the first effects. The rupture of a complete ring of the corky bark of young twigs as the rust pustules break out in the spring (FIGURE 1, A, c) would of itself result in the death of the branch from drying out. Add to this the death of all living cortex cells actually invaded by the parasite, and we must expect a high mortality. By the second or third year, if the branch survives, the infected region will be quite noticeable as a rough, slightly swollen ring an inch or two long (FIGURE 1, A, a).

While making a survey of the red-cedar diseases near Mt. Kisco, N. Y., this spring, we found several small trees, five or six feet

[1] Studies in *Gymnosporangium*—VII.

high, showing up to a hundred or more separate infections of two or three years' standing, as well as many recent infections (FIGURE 1, A, b). One never finds a tree showing very many infections on the old branches like that pictured in FIGURE 1, B, so many twigs must die off very soon following infection. If a branch can survive for two or three years, it has a good chance of living a long time in spite of the parasite. The mycelium spreads very slowly and usually confines its destructiveness to the outermost living cells of the bark, breaking out only here and there in patches and leaving much of the cortex unharmed.

A recent volume on forest pathology merely mentions *Gymnosporangium germinale* as producing "fusiform swellings on the branches." Plant pathologists also seem to have overlooked the fact that the large limbs and the main trunk may bear cankers of long standing, which show up especially well after a rain as rough blackish rings or spots. The sleeve-like ring of infected bark may extend up a limb for several inches (FIGURE 1, B) and the spots on the trunk may be six or eight inches in diameter (FIGURE 2, A) or a foot or two long (FIGURE 1, C, and FIGURE 2, B).

The flaky wound-callus bark on the limbs is very brittle and is easily rubbed off with the hand. This spongy bark soaks up more water and holds it longer than does normal bark. The infected spots show up best in photographs taken some time after a rain and after the normal bark has dried out enough to show its natural color (FIGURE 2, A). Two of the three trunk infections illustrated here happened to be located on the side less exposed to the sun, and both harbored algal or lichenous growths not present on the normal bark. Such infections must have occurred on the tip of the main axis, when the trees were very young; in this case the trees must have been about fifty years old when the photographs were taken. The writer[2] has illustrated in an earlier volume of this JOURNAL the effects of another rust, *Gymnosporangium Nidus-avis*, that is very destructive to the red cedar, as it kills long strips of inner bark of the trunk and large limbs. The canker shown in FIGURE 2, B, may be the result of the infection of this region by two rusts, because *G. germinale* does not usually result in the formation of so much additional wood tissue. The strips or

[2] Dodge, B. O. A destructive red-cedar rust. Jour. N. Y. Bot. Gard. **32**: 101–108. *f. 1 3* 1931.

FIGURE 1, A. Small branches of the red cedar, showing several separate infections by the rust parasite *Gymnosporangium germinale*. The infections resulting in the larger cankers shown at the base occurred two or three years previously. The small cankers are fruiting the second time. This branch was already in a very weak condition when cut off. It would, no doubt, have died. B. Infection on a medium-sized limb recognizable by the rough blackish flakes of bark extending in a ring around the limb. C. Oblong canker on the trunk of a tree about eight or ten inches in diameter.

shreds of hard bark remind one somewhat of the effect of *G. Nidus avis.* The only spores that were being developed at the time the photograph was taken were, however, very characteristic of the hawthorn orange-rust, *G. germinale.*

It would seem that one might readily free the cedar tree from these trunk infections by scraping off the bark down deep enough to remove a few layers of the outermost living cortex cells. If this were done without injuring the cambium the new bark would be perfectly normal. The mycelium is so superficial in the cortex that it might even be killed by washing the canker with some good fungicide after removing the outer bark.

One recognizes infections on hawthorns by the orange-colored pustules which break out all over yellowish welts or swellings on the leaves, fruits, and small branches during the summer. This stage is referred to by mycologists as the sexual stage, because it is here that fertilization occurs and here new forms of the parasite must occasionally arise by natural hybridization. This is a factor that must be taken into account in any attempt to build up resistant varieties of the alternate host plants by selections from nature or by breeding. The Red Delicious and Red Winesap are two good apple varieties said to be resistant to the two common cedar-apple rusts. It is unfortunate that these varieties should happen to be very susceptible to the orange-rust.

The fungus hyphal threads penetrate deeply into the living tissues of the particular hawthorn structures attacked by the orange-rust stage of the parasite. Practically every cell in the region infected will be invaded by haustoria. These are the parasite's organs of digestion, as it were, and it happens that, as they occur in the cells of the hawthorn, they often resemble the human stomach in form, with its duodenum and intestinal extension. Their method of operation is quite the reverse, however, since the haustoria take *into* themselves the digested food obtained from the host cell, which they have invaginated, and pass it on back into the parent hyphal gullet. The host leaves fall prematurely, the beauty of the red fruit is marred, and the small terminal twigs which chance to become infected die during the following winter. Rarely larger branches or main stems bearing cankers live two or three years before dying.

FIGURE 2, A. Red cedar about ten inches in diameter, showing infection by *ymnosporangium germinale,* which has resulted in a blackish spot. This shows up ell after a rain. B. Red cedar about ten inches in diameter, showing a long canker here the fungus has stimulated the development of an excessive amount of wood. he tree was about fifty years old. Photograph at right used by courtesy of the nited States Department of Agriculture, through Dr. M. B. White.

In conclusion, it may be said that while the hawthorn or quince orange-rust is very destructive to the fruit of these hosts, it is not at all harmful to the cedar host, as it appears in later years on the trunk and larger limbs. It does, however, kill off many young twigs within the first year or two after they become infected. The protecting cork layers are broken up to such an extent as to permit complete drying out of the cortex at the point infected.

B. O. DODGE.

EASTERN ASIA AS A SOURCE OF ORNAMENTAL PLANTS[1]

Scarcely 100 years ago botanists first began to realize that a significant relationship existed between the floras of eastern Asia and of eastern North America. The salient facts were brought out by Siebold and Zuccarini, Asa Gray, F. A. W. Miquel and others, who noted that numerous genera in a wide range of families, including both herbaceous and woody groups, were confined to the two regions mentioned, occurring nowhere else in the world.

These genera—to mention only a few—include such familiar ones as *Liquidamber, Liriodendron, Sassafras, Hamamelis, Halesia, Gymnocladus, Zizania, Carya,* and most species of *Magnolia.* In some cases plants native of eastern Asia and of eastern North America are so similar that they have been considered to represent a single species; others which are currently recognized as distinct species can be separated only by highly critical characters and form what may be called "geographic" species.

There is, of course, a reason for this similarity between the floras of these two widely separated regions. It is found in geologic history and in past and present climatic conditions. In earlier geologic times there was a general dissemination of plants in the two hemispheres of the north temperate zone when climatic conditions were apparently more favorable than now. With the advance of the ice sheets during the glacial periods the plants migrated southward where climatic conditions permitted, and such conditions still being very similar in eastern Asia and eastern North America, the plants adapted to these conditions have persisted in both regions, having disappeared over vast areas in the north where they were once dominant.

It is an equally striking fact that the flora of western North America is much less related to the flora of eastern Asia than is

[1] Summary of an address given before the Ninth National Shade Tree Conference at The New York Botanical Garden, September 7, 1933. For most of the lantern slides used to illustrate this address acknowledgment is made to Professor Oakes Ames, Supervisor of the Arnold Arboretum, the pioneer American institution, whose former Director, Doctor C. S. Sargent, had the vision to exploit the Asiatic horticultural-botanical field. To the Arnold Arboretum our American and European horticulturists are indebted for a large number of ornamental exotics of eastern Asiatic origin.

that of our eastern seaboard; and likewise the floras of western Europe and eastern America have on the whole less in common than have the eastern parts of the Asiatic and American continents. Logically, then, we should expect many plants native of eastern America to thrive when introduced into eastern Asia and the eastern Asiatic species to be quite at home in eastern America; and this is the case. Unfortunately, these similarities in climatic conditions favor not only the growth of introduced ornamental and economic plants, but also of various pests of eastern Asia which find themselves quite at home when once introduced, as witnessed by the Asiatic and Japanese beetles and the devastating chestnut blight.

Early Students of Asiatic Flora

We owe our early knowledge of the flora of eastern Asia to such pioneer botanists as Kaempfer, Thunberg, Osbeck, and others. The flora of Japan became known at an earlier period than the flora of China, and as early as 1784 Thunberg published his "Flora Japonica" in which all of the then-known Japanese species were described. No similar work has appeared on any part of China except for the island of Hongkong. In the past century others took up the work, including Siebold and Zuccarini, Maximowicz, and others in Japan; Champion, Gardiner, Reeves, Bretschneider, Bunge, Hance, Sampson, A. Henry, Przewalski, Potanin, and numerous others in China. As early as 1844 the Royal Horticultural Society of London commissioned Robert Fortune to explore China, Japan, and Korea for ornamental plants.

During the past century and continuing through into the present one, a vast amount of field work has been prosecuted in both China and Japan by such missionary priests as David, Maire, Sylvestri, Faurie, Ducloux, Farges, and others, and to these pioneer local residents we owe much of our present knowledge of the flora of China.

It is, however, within the present century that the most active botanical and horticultural exploration has been prosecuted in eastern Asia, by such well-known individuals as Farrer, Wilson, Rock, Schneider, Forrest, Handel-Mazzetti, Kingdon-Ward, and others.

Some idea of the quantity of material collected by these men may be gained by considering the fact that their individual number series run from 8,000 to as high as 28,000 separate collections. It

Some horticultural explorations of eastern Asia have been subsidized by individuals or firms interested in horticulture, such as Veitch, Vilmorin, Siebold, and Bulley; others have been supported by societies like the Royal Horticultural Society in London and our own National Geographic Society; some have been sponsored by institutions like the Arnold Arboretum; some have been financed by individuals, for instance Augustine Henry, Hance, and others, or, particularly in the present century, by the formation of syndicates in which interested individuals took shares, the seeds and plants collected being prorated among them.

This year The New York Botanical Garden organized such a syndicate for a horticultural exploration of the southern Appalachians, the expedition having just returned from the field. This plan received surprising support from horticulturists both in England and the United States. If it proves successful, as we have every reason to believe it will, we hope in the future to be able to send men to other parts of North America, and eventually to finance one or more expeditions, primarily for horticultural purposes, for field work in eastern Asia.

Potential Horticultural Wealth in Asia

It is obvious that this region is the great reservoir from which we must draw future additions to our stocks of hardy ornamental trees, shrubs, and herbaceous plants. While eastern Asia is now fairly well known botanically, its untried horticultural possibilities are infinite. We are already familiar with certain ornamental shrubs and trees of eastern Asiatic origin, including the hydrangeas, spiraeas, barberries, cotoneasters, photonias, the ginkgo, tree of heaven (*Ailanthus*), various conifers, the Japanese flowering cherry, Siberian elm, Asiatic chestnut, *Paulownia,* and numerous others. We know that our own chestnuts were exterminated in the course of a very few years through the introduction of a fungus disease from Japan or eastern Asia, but we also know that the eastern Asiatic chestnuts are highly immune to this disease. If our chestnut forests are to be rehabilitated by chestnut trees, this apparently can only be done through utilization of the immune Asiatic species. The extinction of our elms is now threatened by the recently introduced Dutch elm disease but there is evidence that some of the Asiatic species of *Ulmus* are more or less immune to this

disease. We know that many of the eastern Asiatic species of plants thrive remarkably well with us when once established, and we know that there are literally thousands of species that have not yet been introduced. It is evident that only a small part of the eastern Asiatic species that can be grown under our climatic conditions have been established here. Some of them already introduced thrive where our native species fail. We have good precedent for the belief that others yet to be introduced will be as much at home here as they are in their native land, and it is likely that at least some of these plants will prove immune to diseases that are fatal to our native species.

We should continue botanical and horticultural exploration of eastern Asia, for this is our *ultima thule* for additions to our store of hardy ornamental plants. The south temperate zone and tropical and subtropical species will not stand our climate; the worthwhile European speciês were long ago introduced. No exploration, however, is worth while unless the horticultural and botanical aspects of it be closely correlated, as has been the case in the great expeditions carried on in China by such men as Fortune, Kingdon-Ward, Farrer, Forrest, and Rock.

E. D. MERRILL.

HUMEA ELEGANS

The graceful Australian plant, *Humea elegans*, seems to be rarely cultivated in the United States, although its merit as a decorative subject is fully recognized in Europe, where well-grown specimens used in exhibition groups invariably excite admiration among visitors and usually bring due recognition from the judges.

At many places in Great Britain, notably Hampton Court Gardens, *Humea elegans* is bedded out-of-doors during the summer months; and so many Americans have carried away memories of its fragrance and beauty that the group of thirty-five plants which was in full flower at the Botanical Garden during July and August has been recognized by a number of observers as the well-remembered "incense plant" of Hampton Court.

The value of *Humea elegans* as a decorative subject lies in the elegance of its branched inflorescence, which consists of innumer-

FIGURE 1. One of the thirty-five fragrant specimens of *Humea elegans* exhibited at The New York Botanical Garden during the summer.

able tiny flowers arranged in loosely pendulous panicles, and enclosed in membranous scales, the brownish-red hue of which is responsible for the color effect. In sunshine the inflorescence appears as a shower of burnished copper, and is somewhat grass-like in appearance. It remains in good condition for several weeks.

The simple alternate leaves are ovate-lanceolate, acute, and stem-clasping. Those toward the base of the plant are the largest and those above gradually diminish into heart-shaped bracts. Leaves and stem are rough with glandular hairs, and exhale a

peculiar but agreeable odor which has been described in an old work as resembling a mixture of the scents of red-cedar wood and Hautboy strawberries.

Although few would recognize it as such from casual observation, *Humea elegans* is a member of the Composite family. It is not an easy plant to grow well and is recognized by plantsmen as a test of cultural skill. It is a half-hardy biennial and for best results the seed should be sown in the greenhouse in early August and the seedlings transplanted to flats of light soil and later to three-inch pots. The next move will be to receptacles 5 inches in diameter and in these the plants will remain until early in the new year.

With the commencement of growth in the spring another transfer will be required, and successive moves should be given until eight- or nine-inch pots are attained as finals. Great care must be exercised that the root-mass is not disturbed at any time; large shifts are apt to prove disastrous.

A light but rich soil is desirable, and a liberal portion of dried cow-manure and bone-meal should be added to the potting compost. It is important that the plants be potted high, for this plan minimizes the risk of loss from overwatering, which is one of the great dangers when growing Humeas. Excessive dryness is also to be strictly guarded against, for if once the plants suffer in this way the foliage will surely turn yellow.

Humeas are gross feeders and daily applications of dilute cow-manure water, dilute soot-water and weak fertilizers are necessary when the pots in which they are to bloom are filled with roots. One of the secrets of success with this subject is the maintenance of cool, light, and airy growing conditions at all times. Moisture on the foliage is resented and for this reason accidental spraying with water must be avoided.

T. H. Everett.

SCHOOL FOR PROFESSIONAL GARDENERS STARTS SECOND YEAR SUCCESSFULLY

The courses of study begun last year by The New York Botanical Garden, to give our student gardeners and other horticulturists an opportunity to become better acquainted with the sciences underlying gardening practice, were resumed this fall.

The opening classes were held on October 2 in the rooms of the Horticultural Society of New York. Thirty-nine are enrolled in the second year work. All of these were members of the class last year, except three men from Mr. Clarence Lewis's Estate at Sterlington, New York, who had previously taken a course of training offered at Edinburgh. It is gratifying to have such a large proportion of the men continuing the studies, and these are drawn, as last year, from both the younger men and the more mature managers of estates. One of last year's class, who is now residing in Albany, is commuting each week from there to continue the work.

The demand for a repetition of last year's work is such that it is being given again this year with an enrollment of twenty-three. These are a representative group of professional gardeners of the metropolitan area.

A great majority of the members of the new class have come to us on the advice and recommendation of the men who studied with us last year.

At the opening session, Dr. E. D. Merrill welcomed the class and briefly outlined the purposes of the course. Mr. James Stuart, for many years a leader in all horticultural activities, spoke appropriately for the Horticultural Society of New York, cordially inviting his fellow members in the class to make full use of the facilities offered by the Society. Mr. Fred Sparks, President of the National Association of Gardeners, spoke on behalf of his organization, enthusiastically supporting the project, in which he himself participated last year. He has personally sent out printed announcements of the course to members of the profession throughout Long Island, urging "superintendents and head gardeners to insist that subordinates take advantage of this opportunity to increase their efficiency and thereby increase their earnings, due to the vast amount of knowledge that may be obtained by attending these lectures."

The classes this year are all given on Monday evenings, when lectures in Plant Morphology and Systematic Botany are given each week by Dr. Forman T. McLean and Dr. H. A. Gleason, respectively, for first year members, and simultaneously with these, instruction is given in Entomology by Dr. E. P. Felt, Director of the Bartlett Tree Research Laboratories, and in Soils and Fertilizers by Dr. Forman T. McLean, for those continuing their studies from last year.

Through the generosity of the Horticultural Society of New York and the National Association of Gardeners, the classes are now equipped with a projection microscope, to show microscopic objects to the entire class at once, and with a desk lantern-slide projector, both of which are valuable additions. The new rooms of the Horticultural Society lend themselves admirably to this work, and also make possible more laboratory work in connection with the studies.

The enrollment is as follows:

Edwin Beckett, of Ophir Farm; George Bishop, Brooklyn Botanic Garden; Gerald Blum, Yonkers; J. G. Borin, New York Botanical Garden; Owen Brown, New York City; Stanley F. Bulpitt, Brookside Nurseries; Paul L. Burgevin, Portchester, New York; James Cahill, New York Botanical Garden; William Campbell, Skylands; Edward J. Casey, Rye, New York; Will Christians, Northport, New York; Donald J. Crighton, Hollow Hill; Leonard Drake, Flushing, Long Island; Jay Ebel, National Association of Gardeners; James Esson, Mrs. Eldridge Estate; Jesse Frampton, Greenwich, Connecticut; John Galletly, H. M. Warner Estate; Albert Gebert, New York Botanical Garden; Clayton Griffin, Greenwich, Connecticut; Walter W. Gustafson, East Orange, New Jersey; Kenneth Hadland, A. Ludlow Cramer Estate; Mrs. Dorothy E. Hansell and Elsworth R. Hansell, of the National Association of Gardeners; R. H. Johnson, Carll Tucker Estate; Edward Katt, St. Albans, New York; P. Kettles, C. D. Mallory Estate; Harry Kirkham, Schiff Estate; Robert Larson, West Orange, New Jersey; W. H. Lingard, H. E. Manville Estate; Miss R. Linson, Morristown, New Jersey; Thomas W. Little, Charles Montgomery Estate; J. Harry Logan, Yonkers, New York; Stuart Longmuir, Skylands; D. MacDonald, John T. Scheepers, Inc.; Wm. MacDonald, Westbury Horticultural Society; Ewen MacKinnon, Salvage Estate; John Matthews, Nicholson Estate; Rene Maufray, H. C. Phipps Estate; Francis McDonald, Northport, Long Island; P. J. McKenna, New York Botanical Garden; William Murray, Skylands; Clyde Nellis, Brooklyn, New York; S. Pfander, New York Botanical Garden; Anthony J. Pietruszkiewicz, Grand View-on-Hudson; Mrs. H. Schneider, New York Botanical Garden; Ed-

ward J. Seplavy, Mrs. C. R. Holmes Estate; Theodore Sinzinger, Greenwich, Connecticut; James Skeldon, Hollow Hill; Judson P. Smith, Long Island State Park Commission; Paul Staples, Basking Ridge, New Jersey; James Stuart, Constable Estate; William Taylor, Mt. Kisco, New York; Miss Christine R. Vail, Mrs. Morgan Hamilton's Estate; Fred W. Weidt, Mt. Kisco, New York; Miss Augusta White, Harold Wilson, Walter Wolney, T. Andersen, Donald Dodds, and Stanley Pearson, New York Botanical Garden; Oliver Wilson, Oyster Bay; S. Woodland, Albany, N. Y.

FORMAN T. MCLEAN.

"JUNGLE MEMORIES"[1]

This is the personal narrative of an outstanding and militant figure in the fight for pure drugs in the United States, covering a crowded period in tropical America in 1885–86.

It should have a wide appeal, not only to those interested in South America as such and to all who are fascinated by an explorer's life, but also to those concerned in special fields of biology —botany, zoölogy, anthropology, pharmacy—and those eager to know the historical and economic development of remote sections of the continent.

The period covered is that of Dr. Rusby's first expedition to South America. He takes the reader from New York to Panama, thence down the west coast of South America to Arica and Valparaiso, and then over the Andes through Bolivia and down the Beni, Madeira, and Amazon Rivers, over what was then a little-known and less-traveled route. The book is remarkably well written, with keen observations on a great variety of subjects—the countries visited, their inhabitants, civilized and uncivilized, local customs, striking descriptions of tropical vegetation, and interesting and authentic information on the birds, mammals, fishes, reptiles, and insects observed. One notes with pleasure that although snakes are mentioned, it is chiefly in passing, so one receives no false impressions as to "the snake-infested tropics," so overplayed in advertisements of some books on tropical countries. For those who like excitement, there is excitement enough in some of the

[1] Rusby, Henry H. Jungle Memories. i–xi + 1–388. 1933. [illust.] Whittlesey House, McGraw-Hill Book Company, Inc., New York. $3.50.

adventures described, for the interior of tropical South America in 1886 was no tourists' paradise. The lighter side of life receives its proper share of attention, and many humorous anecdotes are related.

The narrative is entertainingly written throughout, whether dealing with plants or animals or aborigines, or rafting experiences down turbulent streams, or truculent adventurers encountered en route. Even the somewhat specialized chapters on the cinchona regions of Mapiri, the vegetation of the Beni Valley and the rubber stations there, and the Araüna Indians of the Ibon, are not only full of information, but of information attractively presented.

For the more specialized reader, appendices are published, giving detailed information on coca and cocaine, cinchona and quinine, alligators and crocodiles, tropical ants, the Acre and Paren-tin-tin Indians, and the falls region of the Madeira River.

The genesis of the story was Dr. Rusby's objective in making a local investigation of the then little-known drug cocaine for one of our largest firms of manufacturing pharmacists. The very fact that it covers a period nearly 50 years back gives the reader a perspective not to be found in books covering more recent periods.

That Dr. Rusby did make most important zoölogical and botanical collections is not overstressed, for in many of the regions visited he was a pioneer collector. Members of The New York Botanical Garden will be all the more interested when they realize that for thirty-three years Dr. Rusby has served as a member of its Board of Managers and of its Scientific Directors; that his botanical material forms an important part of its reference collections; and that the unstudied material he assembled and brought back to New York nearly fifty years ago had its influence in leading to the establishment of what is now The New York Botanical Garden.

E. D. Merrill.

THE 1933 DAHLIA COLLECTION

The collection of living dahlias at The New York Botanical Garden for the season of 1933 included about 440 varieties. The main borders, south of the railroad-station plaza, contained about 1,100 plants.

Back of the Museum Building there was a special bed of about 130 plants, essentially disease-free, of a few varieties that are especially susceptible to the so-called mosaic (virus) disease. This bed showed what could be accomplished by using only roots of plants that were, to all appearances, perfectly healthy the previous season, and by planting them at a distance from possible sources of infection in the main border. Dr. Philip Brierley, of the United States Department of Agriculture, who made the selections and started this special planting in 1932, published a report on his studies of dahlia diseases in the *Bulletin of The American Dahlia Society* for July, 1933. He finds that the so-called "stunt" of dahlias may be due to various causes. The most reliable sign of the mosaic disease that is transmissible by the peach aphis and is hereditary is to be found in yellowing along the veins of the leaves.

The dahlias were held back and somewhat injured by hot dry weather in July, but the nearly 20 inches of rainfall during August and September, though at times excessive, was on the whole beneficial, and the display during October, up to the cold wind of October 25 and the damaging frost of the next morning, was excellent.

It is estimated that several thousand visitors saw the dahlias on each of the first four Sundays of the month. In addition to the annual dahlia lecture on September 30, there was an informal talk out of doors on Sunday afternoon, October 15. Also, the Garden members were invited to a special view of the dahlias on the afternoon of October 11.

Tests of the popularity of the numerous varieties were held on Saturday and Sunday afternoons. The varieties Satan, Kathleen Norris, Monmouth Champion, Chautauqua Salute, Bonnie Belmont, Adirondack Sunset, Edward Thomas Bedford, Navajo Chief, Nannie Sine, King of the Blacks, Snowdrift, City of Poughkeepsie, The Duchess, Maryland's Glory, Jersey's Dainty, Marge Davis, Mary Geraldine, Jane Dew, Jane Cowl, Champoeg, Galli Curci, Christmas Candy (Pilgrim), and Salem Pride were the leading favorites.

MARSHALL A. HOWE.

A NOTABLE BOTANICAL STUDY

A typical illustration of the study of a plant from its medicinal view-point is found in a paper on *Viburnum Opulus americanum* (Miller) Ait., by Heber W. Youngken, in the *Journal of the American Pharmaceutical Association* of May, 1932. This is No. 3 of a series on the genus *Viburnum*.

It is the broad scope of the study that is specially significant. A résumé of the literature of the species is followed by a comprehensive description of the occurrence, habit, and variation of the plant, as in an ordinary botanical account, after which the internal structure of the stem, and especially of the bark, the part used in medicine, is not only described, but followed in its development. Since it is the root-bark that is chiefly active medicinally, it and the stem-bark have to be studied and described comparatively. And since bark of different ages varies in activity, diagnoses as to maturity are accurately presented. Because much of the bark appears in commerce in the powdered state, minute descriptions of the powders are necessary for purposes of identification and judgment as to purity.

The paper constitutes an excellent illustration of a pharmacognostical study, undertaken primarily to provide means for the identification and selection of the drug. In many cases, such a study would include chemical constituents, but no method has yet been found of determining the value of this particular drug by chemical assay. The paper is freely illustrated.

H. H. Rusby.

A GLANCE AT CURRENT LITERATURE[1]

The 500 food plants of Puerto Rico are said by O. W. Barrett in the September *Scientific Monthly* to have originated from three principal sources. About 150 of them are native, 150 more were brought in during the period of Spanish occupany, and the remainder have been introduced in the twentieth century. Only two other regions in the world can vie with the island of Puerto Rico

[1] All publications mentioned here—and many others—may be found in the library of The New York Botanical Garden in the Museum Building.

in the variety of plants of economic importance, the author says. These are India and the Philippine Islands.

* * * *

Four secrets of a good lawn revealed by M. G. Kains in the *Gardeners' Chronicle of America* for September are: (1) establishment of a grade or contour; (2) good drainage; (3) correct preparation of the soil; and (4) assurance of proper and adequate plant food in the soil.

* * * *

Flowers to plant in acid soils are described by Jessie F. Gould in *The American Home* for September.

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Boxwood canker and other diseases of box are the leading topics of *Nursery Disease Notes* just issued by the New Jersey Agricultural Experiment Station. The article tells how to identify and treat the diseases.

* * * *

Influence of temperature and light on growth and heading of wheat is explained by H. H. McKinney and W. J. Sando of the United States Department of Agriculture in the May *Journal of Heredity*. The authors tell how winter wheat can be converted into spring wheat by soaking and sprouting the seed, then freezing until time for the spring sowing. Such wheat retains certain winter qualities, they maintain, and produces 28 bushels to the acre.

* * * *

"The Effect of Sunlight on the Growth of Flowers" by Frank Thone in the May *Scientific Monthly* tells in understandable language under what conditions spring and autumn flowers come into bloom, and what effects can be produced by artificial sunlight.

The new botanical buildings at the University of Toronto are described in the same issue.

* * * *

Frank A. Waugh gives pointers on how to create vistas in the garden in *Horticulture* for September.

* * * *

"Irises for the Lily Pool and Brookside" is the subject of Robert Wayman in the September *Flower Grower*. Other articles of interest in this number include one on types of peonies and one tell-

ing how to plant them, and "Autumn Planting Suggestions" by Edward C. Vick.

* * * *

" What we need in plant-sociology is a mental process that gives us a standardized product," Dr. H. A. Gleason declares in the Discussion column in *Science* for September 15. Referring to Braun-Blanquet's recent book, "Plant Sociology," he presents his plea under the title, "On Concepts in Phytosociology," while Professor Henry S. Conard, of Grinnell College, handles the subject as "Units of Plant Sociology."

* * * *

Dr. E. D. Merrill has written on "Loureiro and his Botanical Work" in the *Proceedings of the American Philosophical Society*, No. 4 of Vol. 72.

"La Hacienda," a Spanish agricultural magazine published in New York, has translated and published Dr. Merrill's article on agriculture and civilization which appeared recently in *Natural History*.

* * * *

P. W. Zimmerman and A. E. Hitchcock write on the selection, propagation, and growth of holly, in the *Florists Exchange* for September 30 and October 7.

* * * *

Pruning and fertilizing of trees and shrubs, culture of cacti, selection and care of phloxes, and a description of the new Thompson Memorial Rock Garden being constructed at The New York Botanical Garden are among the articles of especial interest in the September *Bulletin of the Garden Club of America*. A vast amount of historical and descriptive material relating to plants is also included.

* * * *

Scenes familiar to every motorist around New York are used to illustrate articles on "Planning State Parks" by Allyn R. Jennings and "Planning for Roadside Improvement" by Wilbur H. Simonson, in the July number of *Landscape Architecture*.

" The Nurseryman and the Landscape Architect " is the subject of a long article by Seth L. Kelsey and of an editorial as well in the April issue of *Landscape Architecture*.

* * * * *

The Gardeners' Chronicle, which is published in London, began

on April 15 a continued article on "Irises in America" as observed by a traveler and grower who visited gardens all over the United States.

* * * *

Pamphlets recently issued by the New York State Agricultural Experiment Station at Geneva include one by G. P. Eseltine describing native American species of crabapples (*Technical Bulletin* 208); No. XI of "New or Noteworthy Fruits" by G. H. Howe (*Bulletin* 620); and "Raspberry Growing in New York State" by George L. Slate and W. Howard Rankin (*Bulletin* 625).

* * * *

"Keeping Rock Gardens off the Rocks" is the subject of Frank A. Waugh in *Horticulture* for July 15.

* * * *

The structure of a small sunken garden and the nature of its plantings are described in the August *American Home*. Leonard Barron treats of greenhouses for a small purse in this issue. Another article tells how to care for the flowers you pick.

CAROL H. WOODWARD.

NOTES, NEWS, AND COMMENT

Dr. E. D. Merrill, Director of The New York Botanical Garden, has just been named one of five new members of a committee of nine, appointed by President Roosevelt's Science Advisory Board organized in July, "to consider in a broad and comprehensive manner the question of policy of the government on scientific work."

Dr. John C. Merriam, President of the Carnegie Institution, is chairman of the committee, and Dr. Karl T. Compton, President of Massachusetts Institute of Technology, is chairman of the government's Science Advisory Board.

Seeds of more than 300 species of native plants have been brought back to the Botanical Garden by the expedition which left August 23 for the southern Appalachians and returned October 19.

These plants, which are little or not at all known in cultivation but which are believed desirable for gardens, will be tested at The New York Botanical Garden and in the gardens of the 24 sub-

scribers to the trip, each of whom will receive a *pro rata* share of the collections.

Nearly 6,000 miles were covered by E. J. Alexander, assistant curator, and Stanley Pearson, student gardener, in their two months of exploration. T. H. Everett, horticulturist, who accompanied them, returned the first of October to open the Botanical Garden's Science Course for Professional Gardeners.

A more complete report of the trip will later be made by the explorers themselves.

Dr. A. B. Stout spent a week during the autumn at the New York State Agricultural Experiment Station at Geneva in further studies concerned with a coöperative project for the development of hardy seedless grapes. Of the seedlings that fruited for the first time this year, twelve have seedless or near-seedless fruits and these bring the total of such seedlings to about 40. Several of the best of these possess considerable merit and are being propagated for trial under general culture and they are also being used as parents in further breeding in the effort to develop still better seedless seedlings. The results of these studies have given data on the types of seedlessness in grapes and their hereditary behavior. Also, hardy seedless grapes of merit have been developed.

Dr. B. O. Dodge, Plant Pathologist, New York Botanical Garden, gave an illustrated lecture on "Sex and its relation to hybridization in the fungi," at the annual meeting of the Department of Botany, Brooklyn Institute of Arts and Sciences, held at the Brooklyn Botanic Garden October 10.

Chrysanthemums of unusual merit are opening the season's displays of flowers in Conservatory Range 1. House 6, which last year was set aside for exhibits of decorative plant material, changing from week to week, is now filled with chrysanthemums of many forms and colors. The display will be continued throughout the month, after which flowers in bloom for the Christmas season will be shown.

S. M. Pady, Ph.D. (Toronto, 1933), who has been appointed a National Research Fellow in Botany, began his studies at The New

York Botanical Garden and Columbia University on September 1. His work will be on the rusts (Uredinales), with special reference to the development of the aecia and the cytology of the promycelium.

Dr. E. D. Merrill has been asked to be the principal speaker at the Homecoming Luncheon of the University of Maine, at Orono, November 11. His subject is "Basic Education for Research." Dr. Merrill was graduated from the University of Maine with the degree of Bachelor of Science in 1898, received his master's degree there in 1904, and the honorary degree of Doctor of Science in 1926.

Dr. Elam Bartholomew, of Hays, Kansas, has recently published a second edition of his "Handbook of the North American Uredinales" (plant rusts). In this work he attempts to list all of the species of rusts known in North America. One of the interesting features of the book is that it contains page references to North American Flora, volume 7, in which these fungi were treated by Dr. J. C. Arthur. It is, therefore, virtually an index to the plant rusts as published in North American Flora by The New York Botanical Garden. The book comprises 238 pages and is mostly bound in cloth.

Meteorology for April.[1] The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: 66° F. on the 2nd; 68° on the 5th; 60° on the 10th, 13th, and 16th; 66° on the 18th; and *72° on the 29th.* The minimum temperatures recorded were: 39° on the 5th; 33° on the 12th; *29° on the 23rd;* and 32° on the 28th. The total amount of precipitation for the month was 5.08 inches.

Meteorology for September. The maximum temperatures recorded at The New York Botanical Garden for each week or part of a week were: *90° F. on the 6th;* 80° on the 17th; 84° on the 24th; and 89° on the 27th. The minimum temperatures recorded were: 52° on the 11th; 58° on the 13th; *50° on the 23rd;* and 51° on the 30th. The total amount of precipitation for the month was 9.67 inches.

[1] Accidentally omitted in its regular sequence.

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GENERAL INFORMATION

Some of the leading features of The New York Botanical Garden are:

Four hundred acres of beautifully diversified land in the northern part of the City of New York, through which flows the Bronx River. A native hemlock forest is one of the features of the tract.

Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

Gardens, including a beautiful rose garden, a rock garden of rock-loving plants, and fern and herbaceous gardens.

Greenhouses, containing thousands of interesting plants from America and foreign countries.

Flower shows throughout the year—in the spring, summer, and autumn displays of narcissi, daffodils, tulips, lilacs, irises, peonies, roses, lilies, water-lilies, gladioli, dahlias, and chrysanthemums; in the winter displays of greenhouse-blooming plants.

A museum, containing exhibits of fossil plants, existing plant families, local plants occurring within one hundred miles of the City of New York, and the economic uses of plants.

An herbarium, comprising more than 1,500,000 specimens of American and foreign species.

Exploration in different parts of the United States, the West Indies, Central and South America, for the study and collection of the characteristic flora.

Scientific research in laboratories and in the field into the diversified problems of plant life.

A library of botanical literature, comprising more than 42,800 books and numerous pamphlets.

Public lectures on a great variety of botanical topics, continuing throughout the year.

Publications on botanical subjects, partly of technical, scientific, and partly of popular, interest.

The education of school children and the public through the above features and the giving of free information on botanical, horticultural and forestral subjects.

The Garden is dependent upon an annual appropriation by the City of New York, private benefactions, and membership fees. It possesses now nearly two thousand members, and applications for membership are always welcome. The classes of membership are:

Benefactor	single contribution	$25,000
Patron	single contribution	5,000
Fellow for Life	single contribution	1,000
Member for Life	single contribution	250
Fellowship Member	annual fee	100
Sustaining Member	annual fee	25
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Contributions to the Garden may be deducted from taxable incomes.

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I hereby bequeath to The New York Botanical Garden incorporated under the Laws of New York, Chapter 285 of 1891, the sum of ———.

Conditional bequests may be made with income payable to donor or any designated beneficiary during his or her lifetime.

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THE NEW YORK BOTANICAL GARDEN
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VOL. XXXIV DECEMBER, 1933 No. 408

JOURNAL
OF
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ETHEL ANSON S. PECKHAM

AN EVERGLADE CYPRESS SWAMP
JOHN K. SMALL

NEW HYBRID POPLARS FOR REFORESTATION
CAROL H. WOODWARD

A GLANCE AT CURRENT LITERATURE
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JOURNAL
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ROCK GARDENING WITH BULBS[1]

Among suitable plants for rock gardens there are many that grow from bulbs and, if we give the word "bulb" a wide latitude and include corms and some other plants which are often admitted into trade catalogues and large treatises on so-called bulbous plants, we have a big field from which to choose.

In planting them, we must consider the conditions offered in rock gardens, which vary greatly in their exposure, soil, and style. The natural ones may have a great deal of shade or they may be sunny and dry. The soil may be quite deep in some places and very scant in others. The kind of soil also is important and the variety of rock from or on which our garden is made.

In selecting bulbous plants even more care should be exercised than in the case of those usually termed "alpine" or "rock garden plants." It is advisable to place your plants where they will feel so much at home that they will need little care and will seed themselves naturally or increase freely from offsets.

The rock garden may sometimes be used as a place to grow and conserve rare plants that need special soil and care, but the general appearance of the whole must always be considered. To spot a rock garden all over with dabs of bulbous plants sprouting up in tufts of strap-shaped foliage is just as bad as dotting stones of equal size at uniform distances all about the surface like the raisins in a pudding or lumps of coagulated fat on the top of cold soup! It has always seemed to me that the greatest danger in planting a rock garden is the likelihood that the final effect might resemble something to eat, either ready to go into the oven or prime for the table! Therefore we should plant enough of one variety or of

[1] Abstract of an illustrated lecture given at The New York Botanical Garden, October 21, 1933.

similar-appearing plants to give mass effects, either as to form of growth or else in connection with color.

An example of this with bulbous plants, if one has only a few bulbs of a variety, would be to use *Scilla sibirica* and varieties and *Scilla bifolia* adjacent to chionodoxas. Contrasts in color are good also if judiciously made, and contrasts in form of plants are very worth while. Thus creeping masses of phlox will set off stiff spears of bulb leaves, and plumy feathers of sedums will make a good foil for crocus "grass." Incidentally, the sedum will make a fine background for the chalice-like cups of the crocus flowers.

Seasonal combinations, such as two spring bloomers, one a bulb, the other a rock plant; or a spring-blooming bulb with a summer- or an autumn-blooming ground-cover or *vice versa*; or even two bulbs of the same group, one of which flowers in springtime, the other in autumn, are also possible.

Bulbs may be used at the edge of the rock garden to help disguise the joint between it and the lawn or meadow from whence it may spring.

Further, the rock garden, because stones retain the heat of the sun for a time, may well shelter a slightly tender bulbous plant that would be discouraged by a late frost that might damage the foliage. The brodiæas may be cited for this use.

The principles of good gardening with bulbs will hold as true in the rock garden as elsewhere: not to destroy foliage, to remove it only after it is ripened; not to transplant the bulbs after root-growth has started unless they are replanted immediately and the greatest care taken to retain all the roots; not to dig carelessly into what appears to be a blank space and so chop up bulbs that you have forgotten were there; to make a plan of where you put your bulbs when you planted them; to put things in the right places and then leave them alone; to watch your garden and restrain one plant if it is encroaching upon another.

If we have a bulb with heavy foliage, as some of the daffodils or the varieties of *Scilla campanulata,* we will be on our guard that the leaves do not lie in mats upon the ground-cover and destroy it, and in placing such bulbous subjects we will rather reserve the space between the bulbs for some tufted plant that will keep its position so we may guide the bulb leaves to lie between its tufts. I have found that daffodil foliage may be tied in knots or bound up

in wads to dry and that crocus foliage may not; it has to be spread to dry. *Scilla campanulata* is the heaviest of all and does more damage to other plants, so for the scilla spaces I resort to annuals. Where annuals have seeded themselves in the late summer and are very thick over the up-coming bulbs in spring, I thin the annuals so they are sprinkled scantily between the bulbs and in this way get better bloom from each set of plants.

Some of the small bulbous plants, such as the earliest scillas and chionodoxas, have their seed-pods on the ends of rather limp stems, so here again one must be on the lookout to see that the seed-pods do not lie over into the next section where seedlings would be lost or destroyed. One can lean them where one wishes and, if the seed is spread too thickly at one place, it may be scraped up when it first falls out of the pod and be sown elsewhere or dried to be given away; but do not attempt to dry it if it seems to be sprouting. Seed seen lying exposed on the surface can be covered with a very thin layer of sifted soil and as some bulbs push to the surface they may be pulled off and thinned or else covered in the same way.

All these are points followed by the good gardener. If your rock garden is in the woods or very close to them and chipmunks and mice abound, you will give up any idea of growing masses of rare crocuses or tulips, and perhaps the rarest bulbs will be planted in sections caged like animals in the zoo—but below ground! Chipmunks then will not transplant your tulips for you or nibble your irises. Rabbits, mice, chipmunks, and squirrels will shy off from applications of naphthalene flake on young sprouts or on bulbs. You will be careful that plants with strong root systems do not overrun your small bulbs, watching columbines particularly, and you will see that shallow-rooted ground-covers are not too thick for bulbs to penetrate.

The season of bloom will be a long one, because it may begin with one of the "outsiders" from a real bulb point of view, the winter aconite, or maybe a very early crocus such as *C. Sieberi* or *C. Tomasinianus* and finish with *C. longiflorus* at the end of November, when the ground freezes solid.

There are numbers of crocus species and new hybrids of species that would give ample chance for a rock gardener to specialize in just that group of bulbous plants, not to mention a large group of *Muscari* or grape hyacinths, many snowdrops, dogtooth violets,

tulip species, *Scilla campanulata* varieties, true hyacinths, fritillaries, and many, many varieties of daffodils. Of irises, the early *I. reticulata* with its forms, Cantab, Cyanea, Melusine, etc., *Iris histrioides, I. Bakeriana* and *I. persica* are invaluable bulbous subjects for a rock garden. They are far more hardy here than we used to be led to believe, and the good drainage afforded by a rock garden will suit them. I find that *Sedum dasyphyllum* is a good combination plant for these small irises with their rush-like foliage, and the small sprinkling of fine stones on the soil surface enjoyed by the sedum is not objected to by the irises.

Some bulbs prefer a limestone soil but most of them are satisfied with whatever they find themselves in. *Muscari* and *Crocus versicolor* are native on limestone, and the latter, I believe, needs limestone. But some of the narcissi need a peaty soil to thrive and may be tucked in on the edges of patches of heather. *Narcissus minimus* is one of these

N. Bulbocodium should be given some protection and *N. cyclamineus* is perhaps too rare to be risked just anywhere; certainly, good drainage, sun, and no competition with strong-rooted neighbors are essential. *Narcissus Johnstonii* is "easy," while many of the new *triandrus* and *cyclamineus* hybrids are no trouble at all. *N. juncifolius* and *N. Jonquilla* are delightful for their rich color and their perfume, and there are small Barrii and Poeticus varieties that have been in commerce long enough to become reasonable in price, which may be used to vary the color range. Firebrand, Silver Salver, Circlet, and Glitter are all nice, as is Elizabeth Ryan. Indeed, in all of the sections there is a choice of small varieties, and if one desires new and rare hybrids they can be found also. Thus one will soon find one's discrimination developing and a knowledge of what quality means in a bulbous plant appearing in the change of one's likes and dislikes.

The visit to the bulb specialist's nursery will not be to see what new huge affair has been produced but to ascertain what modest restraint of beauty may be encountered.

Thus rock gardening with bulbs will train us to study more about them, to refine our knowledge and, in the matter of daffodils alone, we will find ourselves discounting a Fortune in favor of a Harvest Moon.

ETHEL ANSON S. PECKHAM.

AN EVERGLADE CYPRESS SWAMP

Various floristics have been attributed to the Everglades, some real, others imaginary. A very real and conspicuous plant association in the southern part of the Everglades seems to have escaped especial attention or at least description.

After leaving the Everglade Keys near Royal Palm Hammock, Dade County, and traveling a few miles toward the southwest, isolated, scrawny cypress trees appear in the landscape. The dwarf cypress trees and the white or pale-gray bark of their trunks and branches attract the attention of everyone passing along the trail toward Cape Sable, which lies about fifty miles further to the southwest. In scattered colonies the stature of the trees and the peculiar mode of branching suggest almost universally so many skinny spectres, especially in the horizontal rays of the sun in early morning or late afternoon.

These pygmy cypress forests have the aspect of great age. The trees evidently have a very slow growth. After nearly thirty years of observations in various parts of this swamp no changes in the gross aspect or size of trees anywhere have been noticed.

The most closely related tree association is that of parts of the Big Cypress Swamp which lies some sixty miles to the northwest across a wide expanse of the Everglade prairie.

The area occupied by the cypress growth in question is an immense limestone reef so gently undulating that the differences in elevation can be noticed by the layman only when the surface is partly flooded or by the botanist when he observes the types of vegetation.

The rock foundation is covered primarily by a thin layer of marl. A little field experience will enable one to judge the thickness of the marl-stratum by the growth of the cypress trees. However, the growth is not wholly regulated by the mere thickness of the marl. There is a certain system of relativity operating through the amount of organic plant-food that has become incorporated in the marl.

Where the marl is very thin there are forests of thousands of trees of this peculiar form of the pond-cypress varying from a foot to six or eight feet tall. The trees may be scattered or closely set together. They form a second story of vegetation, but the first story is a scanty growth mainly of grasses and sedges (see FIGURE

FIGURE 1. Portion of unique cypress swamp in southern Dade County, Florida. This swamp comprises many thousand acres. The area shown in this figure is covered with a very copious growth of dwarf cypress trees. In all cases the trees have the appearance of having been whitewashed. Frequently areas are devoid of the cypress growth as shown in the foreground, most likely on account of the very thin layer of marl over plate-rock.

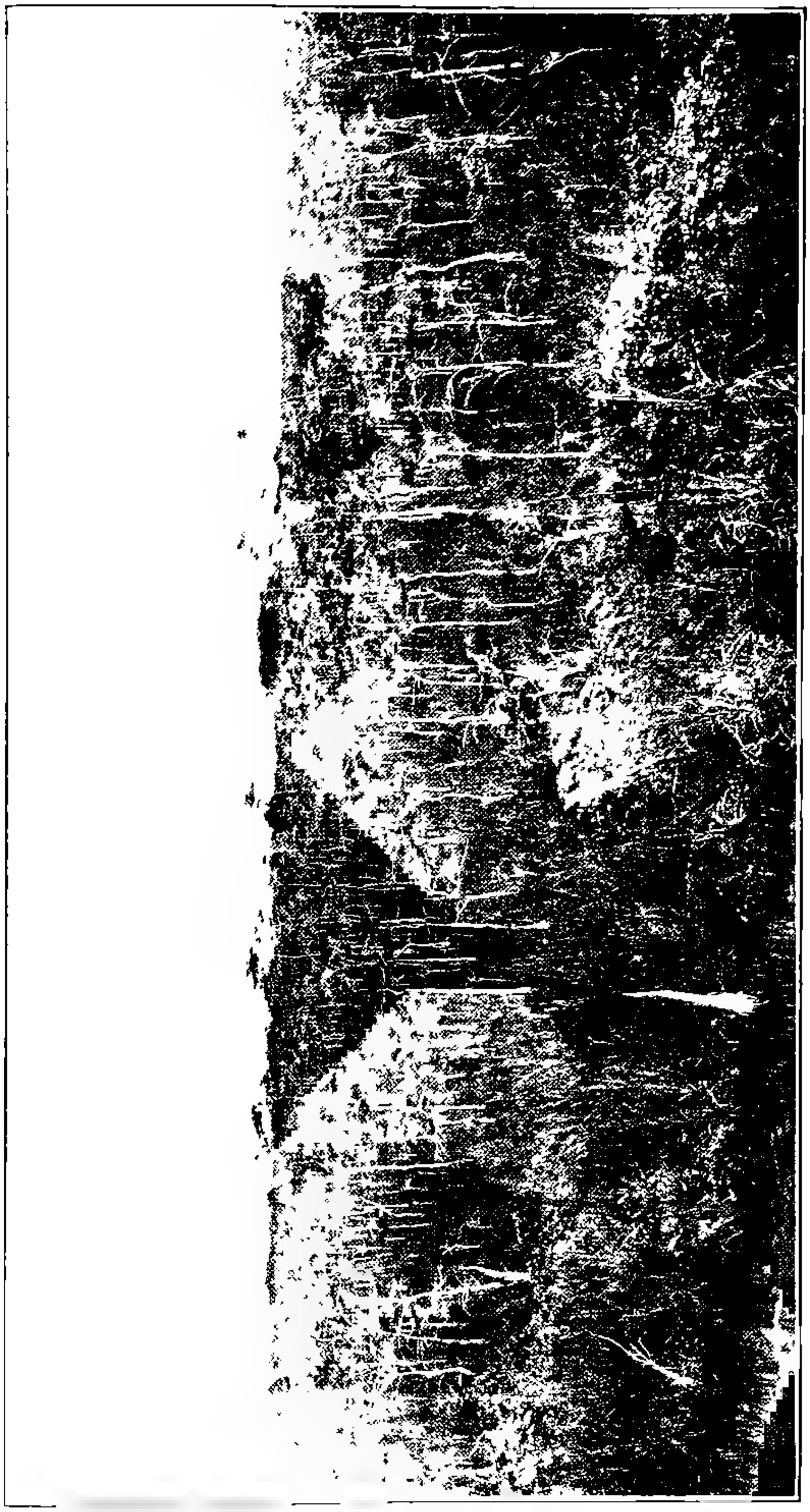

FIGURE 2. Cypress trees in relatively scattered growth. It is such an area where the trees, in early morning or late afternoon, suggest a host of skinny spectres scattered over the Everglade prairie.

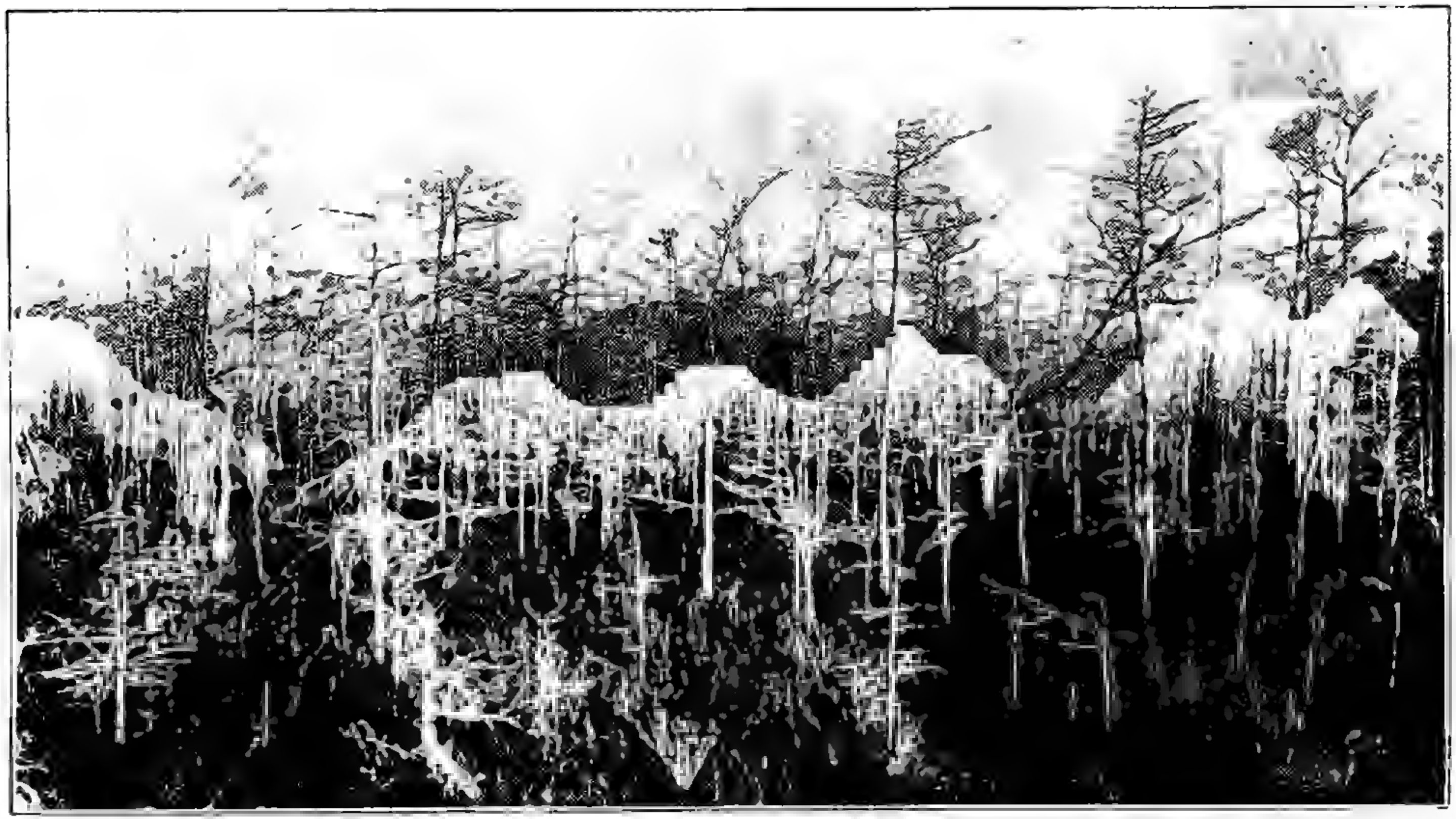

FIGURE 3. A view showing the maximum size of the trees of this peculiar form of pond-cypress, as well as the most copious growth of the first-story of herbaceous plants.

FIGURE 4. A slightly elevated rock-reef that once supported one of the myriad hammock islands of the lower Everglades. Such, mostly hidden reefs, with little marl and a deep accumulation of humus, enable the broad-leaved shrubs and trees to thrive, although the trees, except the live-oak (*Quercus virginiana*), seldom become very large. The hammocks are known to be of great age, for one may often find the pure humus deposit over the rock three to five feet deep.

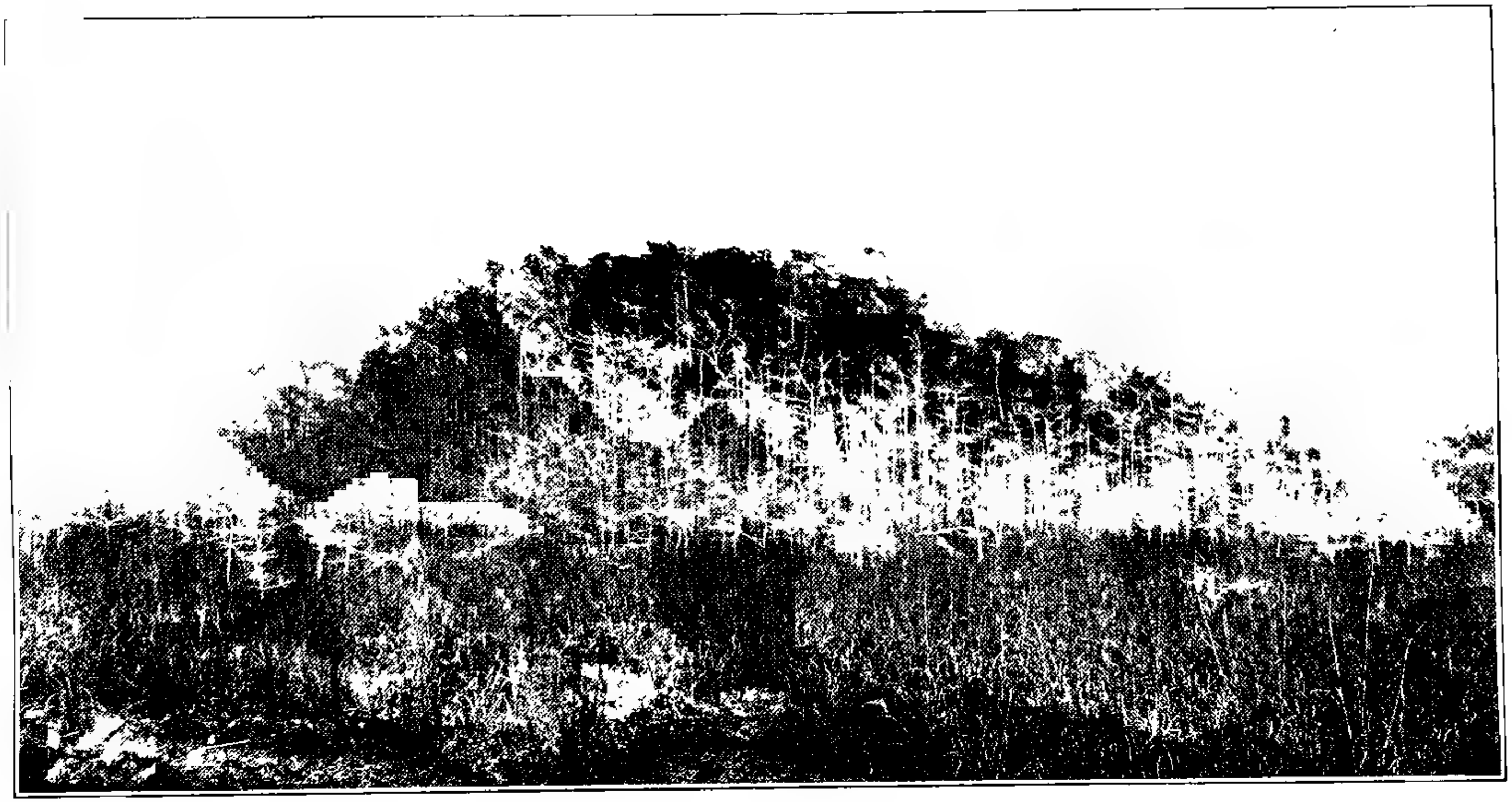

FIGURE 5. An area in the cypress swamp, showing several steps in the vegetation—in the foreground only herbaceous plants, then scattered "spectres," then two patches of a very dense growth of dwarf cypresses, behind which are the larger trees surrounding the hammock island.

1). Where the marl is slightly deeper, the first story of vegetation is more vigorous. Here it is augmented by and made more conspicuous by additional flowering herbaceous plants (FIGURE 3).

This part of the Everglades, like most of the southern half of this vast savannah, is dotted with thousands of hammock islands. These islands represent the only spots in the Everglades that have not been seriously fireswept in prehistoric and historic times. Contrary to the popular opinion, they are not necessarily low spots. These are more frequently circular or irregular elevations of deeply eroded rock, often with a kind of moat which, together with the usually wet or moist accumulated humus in erosion holes and a consequent vigorous growth of broad-leaved shrubs and trees, served to stop the prairie fires that swept the Everglades through the ages. The fires as a result of lightning and aboriginal methods of civilization were evidently not so frequent as those resulting from careless use of fire and vandal incendiarisms following the white-man's occupation, for many hundreds of these picturesque hammocks have been rapidly and completely wiped off the face of the Everglades within the past score of years.

Had not prairie fires swept the spot shown in FIGURE 4, this ragged reef would have looked somewhat as that shown in FIGURE 5. Here is a hammock island of broad-leaved trees—pigeon-plums (*Coccolobis*), mastic (*Sideroxylon*), coco-plum (*Chrysobalanus*), dahoon-holly (*Ilex*), myrsine (*Rapanea*), marl-berry (*Icacorea*), etc. There may be a cordon of saw-palmetto (*Serenoa*) around the edge of the hammock-growth, always tending to grow outward, thus making the entrance of fire more difficult. Then comes a cordon of cypress, the tallest coniferous growth in this cypress swamp, taller than the rest of the cypress growth because it has the moisture from the hammock and the moat around it to draw on. As the moisture away from the moat fails during dry spells, the cypress trees rapidly shrink to the lower growths shown in FIGURES 1, 2, and 3.

The prairie landscape of the Everglades, embellished with the unique cypress growth or the hammock islands or with both, especially with the rising or the setting sun, is both unique and enchanting. A few more years of the white-man's incendiary mania and the landscape will be absolutely without relief.

JOHN K. SMALL.

NEW HYBRID POPLARS FOR REFORESTATION

Reforestation of waste land with trees which may prove economically profitable comes nearer and nearer to being a possibility, as work on the hybridization of poplars progresses.

Under the guidance of Dr. A. B. Stout of The New York Botanical Garden and Dr. E. J. Schreiner of the Oxford Paper Company, significant results are now shaping themselves after nine years of work.

When reports of their early experiments were made several years ago, there was much excitement in the air, and many unfounded statements and predictions were made. Some of these, some day, may prove true. But the authors of the work are not yet ready to announce what the future will bring from their research work of today. They have, however, made a scientific report of the present results of their work, which has appeared in *The Journal of Heredity*.

Poplars were chosen for this project, not only because they possess the advantages of rapid growth, but because they are valuable for pulp-wood (also cheap lumber, excelsior, and cellulose), and in a few years' time they will be able to alleviate the serious drain which this product is making on the forests of today.

About 100 cross-combinations among 34 species, varieties, and hybrids of poplars were made for the experiments. The 13,000 seedlings which resulted presented a great diversity in character. The breeders selected 600 of the most promising of these, and set out the rest in a reforestation planting. After seven years' growth, some of these made such an excellent showing that they too were chosen for propagation.

Meanwhile, the original selections had been closely studied through nursery propagation, and the elite of these were taken for further consideration. At present, 69 individual seedlings have been selected as plants of special merit for use in reforestation.

Further trials in reforestation plantings would no doubt lead to a reduction in the number of hybrids considered most valuable for culture.

Many poplars are perfectly hardy in Maine, where these hybrids are being tested especially. However, one group of valuable

hybrids (*Populus Maximowiczii* × *P berolinensis*) has continued vigorous growth so late in the fall that the tops of the young trees have been injured by frost. It is believed that a tree of this type might have special value, therefore, farther south.

The hardiness required in a selected seedling includes its ability to start growth early and to grow rapidly all summer, but to stop growth early enough so that there is little or no injury from autumn frost or winter cold. A growth of eight and nine feet has been known to be made in one season by many of the new hybrid poplars, and more might be made by the hybrid group just mentioned in a climate where frosts are infrequent or absent.

Studies made by Dr. Schreiner show that the wood of such rapid growers contains no more air space than that of the slower-growing aspens, and that in weight and yield of pulp they are highly satisfactory in comparison with the wild species.

The amount of growth made in one season is an important factor in the choice of a poplar hybrid, but a tree must be vigorous as well as fast of growth, and must prove itself virtually resistant to disease. Many seedlings of promise have had to be discarded because of the ravages of rust on leaves or the destruction caused by cankers on cuttings. Others, however, have not seemed susceptible.

A tree must possess the ability to root readily from cuttings without the likelihood of injury, for by propagation from cuttings, the "hybrid vigor" of a seedling can be retained in the future stock. "Fortunately," Dr. Stout and Dr. Schreiner report, "many of the hybrids root more readily from cuttings than do their parents."

In fact, they say, it is certain that the best of the new hybrids surpass all wild species and the older hybrids in usefulness for profitable reforestation, because, at least in nursery tests, they are generally more vigorous in growth and more resistant to disease. Some may prove suitable as well for new ornamentals, especially those of columnar habit of growth—a characteristic which has been found to be conveniently hereditary. This trait is of value also in trees to be cut for pulpwood or lumber.

Certain of the hybrids produced in these experiments combine desirable qualities not found in any single poplar species or clon heretofore known.

Of the 34 different poplars used in the hybridizing, 3 were white poplars, 5 were aspens, 17 black poplars and cottonwoods, and 9 were balsam poplars. As the final selections now stand, they include 27 combinations of hybrids involving black poplars, cottonwoods, and balsam poplars. There are 5 combinations and 14 individual seedlings of hybrids between different types of black poplars and cottonwoods. Five combinations with 16 individuals involve only balsam poplars. Seventeen different combinations, from which 39 individuals were selected, were made between the two groups.

Among the most successful parent trees were the necklace poplar (*P balsamifera virginiana*), *P. charkowiensis, P nigra* with its two varieties *plantierensis* and *betulifolia* (all black poplars or cottonwoods), and *P. berolinensis* and its variety *rossica, P Maximowiczii, P trichocarpa,* and *P. laurifolia* (balsam poplars).

Ten of the best hybrids, which are being propagated as clons, in order that all characteristics of the desired plant may be transmitted vegetatively to the stock derived from it, are being grown as tests in various regions offering diverse conditions. These have been named, for convenience in identification, Andover, Androscoggin, Frye, Geneva, Maine, Oxford, Rochester, Roxbury, Rumford, and Strathglass poplars.

CAROL H. WOOWARD.

A GLANCE AT CURRENT LITERATURE[1]

Ornamental vines comprise the subject of M. G. Kains in the *Gardeners' Chronicle of America* for November, while Lois L. Covey describes a cold greenhouse which is within the reach of the average gardener's purse, and L. B. Creasey writes about three valuable evergreen barberries.

* * * *

In addition to continuing "ABC's of Rock Gardening" by Alice Miner and "Forms of Pine" by Arthur D. Slavin, *The National Horticultural Magazine* for October contains "Notes on Bulbous Iris" by Charles E. F. Gersdorff, "Brodiæa" by Carl Purdy, and "A Garden of Pentstemons" by D. M. Andrews, to mention only a part of the month's contributions.

[1] All publications mentioned here—and many others—may be found in the Library of The New York Botanical Garden, in the Museum Building.

CHRYSANTHEMUMS AT THE AUTUMN FLOWER-SHOW

The New York Botanical Garden was awarded a silver medal for this display of chrysanthemums at the annual autumn flower-show of the Horticultural Society of New York, held November 3–5, 1933. Banked against a great black meteorite to the right of the entrance at the American Museum of Natural History, the collection made a colorful spot in the rotunda.

Practical gardening information, with pictures of gardens of unusual charm and lists of plants for various uses, is given by Romaine B. Ware in the October *Nature Magazine*.

* * * *

The thrilling story of the search for the *Dendrobium* orchid, specimens of which flowered from seed for the first time at the Missouri Botanical Garden this year, is told in the October *Bulletin* of that institution.

* * * *

The *Bulletin of the Torrey Botanical Club* for November contains a biography of Dr. Arthur Hollick, former Paleobotanist of The New York Botanical Garden, who died last March, and a list of his scientific publications, by Dr. Marshall A. Howe, Assistant Director of the Garden.

* * * *

The culture of camphor is being introduced into Italy, and the story of its beginnings is told in the September and October numbers of the *Rivista Italiana delle Essenze, dei Profumi, e delle Piante Officinali.*

* * * *

"Fertilizers and Crop Production" is the subject of Lucius Van Slyke, in a book edited and published, after his recent death, by his son, Donald D. Van Slyke.

* * * *

"The Maintenance of Soil Fertility" by Charles Embree Thorne is another new volume in the same field, while Alva Agee has contributed to the subject a small book, also in the Garden's library, called "The Right Use of Lime in Soil Improvement."

* * * *

As part of the Farm & Garden Library of the Orange Judd Publishing Company, Victor R. Gardner has written on "The Cherry and its Culture" and John C. Wister on "Lilac Culture."

* * * *

Other new books from these same publishers include "Forests and Mankind," by Charles Lathrop Pack and Tom Gill; "Forestry: An Economic Challenge," by Arthur Newton Pack; "Planning and Planting the Home Garden," by Pauline Murray, a volume well illustrated with sketches, photographs, and useful tables

for the small gardener; and "The Book of Trees," by Alfred Carl Hottes, which deals principally with tree culture.

* * * *

How to take care of evergreens is explained by C. H. Connors in *Circular 288* of the New Jersey Agricultural Experiment Station.

* * * *

"Electricity Comes into the Garden" is the subject of Leonard Barron in the October *American Home*. He describes the uses of electric heating of hotbeds. In the same issue, Claire Norton writes under the title, "Know Your Tulips." Describing table delicacies raised in a basement garden, Linda Clement Hines mentions asparagus, endive, rhubarb, and blanched turnip buds, as well as mushrooms.

* * * *

A serial discussion of the problem of acquired physiological immunity in plants by Kenneth S. Chester, of the Arnold Arboretum, is concluded in the September number of *The Quarterly Review of Biology* with consideration of the questions of acquired immunity in parasitism and in symbiosis and the significance of acquired immunity.

* * * *

"Plant pathologists of this country are working in the interests of the consumer," Neil E. Stevens states in the October *Scientific Monthly*. "And it would promote better relations all around and more effective progress," he concludes, "if that fact were generally understood."

* * * *

Weeds as a factor in the spread of plant diseases and in relation to insect pests are considered in the June *Bulletin of the California Department of Agriculture*. A note by Walter S. Ball, Chief of the Bureau of Weeds and Weed Control, indicates that the artichoke thistle, introduced as a vegetable for cultivation, has become a serious weed pest in some parts of California. This bulletin is well illustrated throughout with colored plates.

* * * *

The American Botanist for July reports orchids growing on an abandoned automobile standing under a tree by a Florida roadside.

A. W. Smith, who claims he has never lost a specimen from his fern garden in the mountains in New Hampshire, tells how he has handled his many varieties in the usually difficult task of transplanting them, in the April–June issue of the *American Fern Journal.*

* * * *

The New Flora and Silva for July treats of *Cyclamen, Hamamelis,* Japanese primulas, hybrid peonies, hellebores, and *Azara,* a South American evergreen. While some of the cultural directions given could be applied only in the British Isles, many of the plants mentioned are of equal value, under different conditions, to gardeners in the United States.

* * * *

More than 150 articles of practical scientific value are contained in the *Proceedings* of the 29th annual meeting of the American Society for Horticultural Science.

* * * *

Characteristics of palms and the palms of Panama are contained in fascicles 1 and 2 of volume III of L. H. Bailey's *Gentes Herbarum.* The author declares that palms "are the least perfectly known of any of the great groups of vegetation."

* * * * *

"Mushroom-growing in the United States" is the title of Circular 251 of the United States Department of Agriculture, by Edmund B. Lambert.

* * * * *

Plant pathology in the United States first received attention when Michigan passed a law in 1875 to eradicate peach trees affected with "yellows." The first quarantine was then established against plant disease. During the decade from 1871 to 1880, state experiment stations began to be organized, and their practical work was greatly aided by the adoption of Bordeaux mixture, which was first used in France in 1882. Before this, however, there were scattered instances of the recognition of the need to curb plant diseases, and these are the subject of a highly enlightening paper by Neil E. Stevens in the *Journal of the Washington Academy of Sciences* published September 15.

CAROL H. WOODWARD.

WINTER LECTURES AT THE GARDEN

A program of lectures of special horticultural interest has been arranged for December, January, and February at The New York Botanical Garden. They are given in the Museum Building on Saturday afternoons, beginning at 3:30, and are free to the public.

December 2. "Evergreens," Mr. William Ing, Horticultural Advisor, R. H. Macy & Company, New York City.

December 9. "Origin of Modern Roses," Mr. Stanley W. Fuller, Manager, Troy's Garden Nurseries, Bedford Village, New York.

December 16. "Cold Frames and Hot Beds," Mr. John Watts, Supt., H. E. Manville Estate, Pleasantville, New York.

January 6. "Flower Arrangement," Mr. G. H. Gillies, Supt., Marshall Field Estate, Huntington, Long Island.

January 13. "Hardy Fruits for the Small Garden," Mr. Arthur W. King, Supt., Jesse Isidor Straus Estate, Mount Kisco, New York.

January 20. "Rock Garden Construction," Mr. A. C. Pfander, The New York Botanical Garden.

January 27. "Soil in Relation to Garden Problems," Mr. John Smith, Supt., F. E. Lewis Estate, Ridgefield, Connecticut.

February 3. "Seeds for the Garden," Dr. A. B. Stout, Director of the Laboratories.

February 10. "Diseases and Insect Pests of Ornamental Plants," Dr. B. O. Dodge, Plant Pathologist.

February 17. "Feeding Hungry Plants," Dr. Forman T. McLean, Supervisor of Public Education.

February 24. "Dahlia Culture," Dr. M. A. Howe, Assistant Director.

NOTES, NEWS, AND COMMENT

A conference of the scientific staff and registered students of the Garden was held November 1st, at which time Mr. E. J. Alexander, Mr. Stanley Pearson and Mr. T. H. Everett gave reports on their recent exploration in the southern Appalachians for the collection of plants and seeds. A detailed report of this botanical exploration will be published in the near future.

Dr. A. C. Smith, who is on a year's leave of absence from the Botanical Garden to collect plants in the Fiji Islands, wrote on October 8 that he was well located in Suva after a pleasant trip from Honolulu, where he stopped on his way across the Pacific.

He is making the trip on a fellowship from the Bernice P. Bishop Museum there. From Suva he planned to take the weekly cutter to the island of Kandavu, to do collecting for a month or six weeks. The flora of Kandavu, he said, was little known, as only Seemann had previously collected there for a short while.

Bringing with him 40,000 specimens of plants from the Hawaiian Islands, where he has been collecting for about eight years, Otto Degener, formerly a student at The New York Botanical Garden, is now working again at the Garden on the classification of his plants, for the second volume of his Flora Hawaiiensis.

While here in 1924, Mr. Degener classified the plants which he had collected during a year as a graduate student at the University of Hawaii. He returned to Hawaii, being associated first with the University, then with Hawaii National Park as naturalist. Since bringing out a popular volume on the plants of this park, he has been carrying on independent research on the flora of the islands. He brought with him to this country a Filipino and a Korean to assist him in his work. The latter is serving as artist for his forthcoming work, in which about 5,000 species of plants will be described. The New York Botanical Garden, which provided a small fund in 1928 for collecting on Molokai, will receive a complete duplicate set of specimens.

He is also presenting to the Garden several hundred plants collected in the United States late in the summer while motoring across country from the west coast.

Seventeen cases, containing the bulbs of 39,500 tulips and 8,100 hyacinths, were received last month at The New York Botanical Garden as a gift from the Dutch Bulb Exporters' Association. With them came plans for the proper location of each species in planting, following a map of the tulip beds which had been forwarded from here at the request of the growers. The 67 varieties of tulips in groups of 200 to 1,000 each will be set out in part of the iris garden, where the cannas were blooming in the fall, and where the summer gardens of heliotrope and lantana were planted last season in the court of the main conservatory. Seven varieties of hyacinths will also be planted in the court.

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THE NEW YORK BOTANICAL GARDEN
Bronx Park, New York, N. Y.

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Plantations of thousands of native and introduced trees, shrubs, and flowering plants.

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